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ABSTRACT

Part of a continuing series intended for use by reading professionals interested in understanding and improving the reading of adolescents, this report contains five articles dealing with a variety of subjects. Specific topics discussed in the articles are (1) readability, (2) reading deficiencies and previous English instruction of land grant university students at the entry level, (3) reading ability and knowledge of the reading process among remedial and nonremedial readers at the postsecondary level, (4) research concerning the effects of guided imagery upon reading performance, and (5) reading comprehension research. In addition, the report provides reflections upon two articles previously published in the series. (FL)

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RESEARCH ON READING IN SECONDARY SCHOOLS

A Semi-Annual Report

Monograph Number 10-11

Edited by

Patricia L. Anders
Reading Department
College of Education
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Tucson, Arizona
85721

FALL-SPRING, 1983

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This monograph series is planned and published as a non-profit enterprise by faculty and doctoral students in the Reading Department at the University of Arizona. It is intended to reflect, not dictate, the trends and interests of reading professionals interested in secondary education.

One unique aspect of this series is that the editorial board is particularly interested in receiving papers from doctoral students and from assistant professors. It is our belief that many of the professionals in these categories do not publish their research findings because of a perceived and existing difficulty of "breaking into the publishing game." We hope to encourage "first-time" authors by providing such an opportunity and encourage such prospective authors to submit papers or questions to the editors.

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P.L.A.

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Examination of Adolescents' Reading:
An Earth Science Assignment

Joseph L. Vaughan
East Texas State University

While much is being done to facilitate the reading comprehension of adolescents, I fear that too little attention is being given to what adolescents do when they read. The literature is replete with suggestions for teachers in content areas, and both research and pedagogical sources now reflect the most recent trends in metacognition and metalinguistic awareness. Where, though, is the evidence that adolescents really need what is being touted as being in their best interest? It was this question that sparked my curiosity several years ago while I was trying to validate a spatial learning strategy with adolescents. I queried, "Why do I think these kids need this strategy?" (Much of the evidence, by the way, is now available in a monograph from NCRE edited by Allen Berger and H. Alan Robinson which is cited in the references particularly for the Estes (1982) article as that article applies most directly to this paper.)

As I found myself in classrooms on a regular basis during that validation study and during several inservice visits, I began to pose some direct questions to adolescents about their academic reading. In particular, I asked them to try and describe for me what they do when they read their school assignments. (I only asked about expository texts as that type of text clearly dominated their homework.) As expected, I heard varied responses; however, one response emerged as the dominant one, "I try to memorize definitions and details." When I pursued that response to find out why students chose such an approach, I heard, almost as one voice, "because that's what teachers test." It was then that this current project began, for I wanted to learn more about what they remember and understand of what they read.

This report is the first in a series where we seek to describe various "events" of reading engaged in by adolescent readers with typical academic assignments in expository textbooks. Eventually, we will have enough evidence from our eight events to make some generalizations across passages and across events; at this point we will limit our discussion to a description of what happened and how various factors seem to have contributed to the event. The event that we will discuss in this and the following two papers is based on one that involved several sections of an eighth grade physical science class where students read their regular assignment from the textbook (Coble, Murray, & Rice, 1981,, 244-250). The variations in normal instructional routine were limited to having students read in class rather than outside of class, and students were told at the beginning of the session that we would check their comprehension when they finished. No time limit was imposed and students were told to study the assignment as they normally did.

A first consideration in this anatomy of an assignment is the text itself, and the question to be addressed is what Robbie Kantor refers to as the considerateness of text (Anderson, Armbruster, & Kantor, 1980). Before the considerateness of this particular text is discussed, you may want to read it ("Topography of the Ocean Floor") and it is included as Appendix A.

In our text analysis, no effort has been made to quantify the appropriateness or the considerateness of the text; nor have we chosen to use any of the more elaborate text analysis systems being used in other research studies. We have instead sought to identify the conceptual level of each statement in the text according to three hierarchical levels, the main idea (superordinate) concepts, the major subtopic (subordinate) concepts, and the detailed (specific) concepts. Our definitions for these conceptual levels and the hierarchical specification of the conceptual statements in "Topography of the Ocean Floor" are included as Appendix B following this paper.

Our purpose in examining this text has been to understand the source of readers' comprehension. By delineating the conceptual statements in the text hierarchically, we were able to answer some questions for ourselves relative to whether main ideas were clear and elaborated and whether major supporting concepts were explicitly stated and related to main ideas. In effect, we suspected that the concepts may not have been presented in a considerate manner for a naive, uninformed reader. To facilitate this form of analysis, we devised a checklist of text considerateness simply for guidance as we sought to answer the key question, "Is this text considerate?" The questions we devised were verified by Tom Estes, Tom Anderson, and Rob Tierney as being "the kinds of questions to ask to determine the considerateness of a text." The questions we are using are as follows:

1. Are the main ideas of this selection clearly stated?
2. Are the major supporting statements clearly stated and clearly related to the main idea(s)?
3. Does the text introduce new concepts one at a time with clear examples and/or explanation of each?
4. Does the text avoid irrelevant, distracting details?
5. Are the examples more vivid than the explanations of the concepts they are intended to amplify?
6. Are non-essential details clearly related to more important concepts?
7. Does the technical vocabulary overwhelm and interfere with readers' understanding of concepts?
8. Does the text included non-technical vocabulary to explain and clarify concepts?
9. Are concepts at all levels integrated and related such that questions are answered not raised for a naive, uninformed reader interested in the content?

These questions can be traced to various sources in various forms, including the Irwin/Davis checklist (1980) and numerous reports from the Center for the Study of Reading. Our checklist is not intended to be exhaustive, only a point of departure. Let us, then, examine "Typography of the Ocean Floor" for its conceptual considerateness.

The first step in the analysis of the text for considerateness was to identify the concepts within the selection and order them hierarchically. We chose intact sentences as our conceptual units because we found that the majority of the sentences reflected a singular concept and because we would not have the opportunity to have students identify idea units in the selection as proposed by Estes and Shebilske (1980) following the suggestions of Brown and Smiley (1977). While this may not be ideal as text analysis, it did provide us with a conceptual flow (see Appendix B) from the superordinate to the specific through each of the subordinate concepts.

What we determined from this was that the text was reasonably considerate. As we examined the text with our series of questions, we determined that the concepts were stated clearly and that the details, although somewhat irrelevant at times, did contribute to an overall understanding of the key concepts. The text did seem to lose some cohesion in the last few paragraphs, and at one point it forces the reader to infer the relationship between the size of the abyssal plains in the Pacific and Atlantic Oceans and the presence of river flow and trenches. From an analysis of the text, then, it appears that students should be able to understand and remember the essential concepts and the supporting details. The text itself does not appear to be a factor that would contribute to comprehension difficulties for an average eighth grader.

Just as we were all set to declare this text basically considerate, one of our team who had been focusing on another aspect of the project popped in and asked, "Where do you want my evaluation of the considerateness of the oceans passage?" I had forgotten that we had asked her to do a different sort of analysis. While a couple of us had been off visiting colleagues at the Center for the Study of Reading to inquire about our questions for considerateness, Lyn Rothwell had been charged with the task of trying to determine if the text was considerate and what questions she had tacitly dealt with as she made her decision. We had done this to see if she would come up with the same sorts of items that we had generated over months of scrutiny. Although Lyn did use the same basic questions to arrive at her assessment, she also used something others of us had not used, namely the original source. This happened simply because the original folder containing the textbook selection had been misplaced during an office shuffle; when the time came to analyze the considerateness of the text in terms of conceptual development, we decided to use the listing of conceptual statements (not the same as in Appendix B) that had been used to determine students' familiarity and importance ratings. Lyn used the text selection because she had found the folder and did not realize that others of us had used the listings of statements for our evaluation. The differences in our evaluations of the text are directly traceable to the form of the text that was examined. If you have read the selection as it appeared in the textbook, Appendix A, you might want to read the conceptual listings statements that is included as Appendix A to the next paper by Lyn Rothwell. When these two versions of the text are read side by side, the differences in how one perceives this text become apparent.

While the authors of this textbook have prepared an informative selection about the topography of oceans, the text selection is most inconsiderate in its structural format. The conceptual flow is reasonably coherent and unified; the structural format of this selection is noisy and distracting. The laboratory investigation, the library investigation, the list of major ocean trenches (that invites memorization of all the names and numbers---something "teachers love to test"), two figures and a picture overwhelm the concepts expressed in the text. Add to the abundance of visual arrays the stress on technical vocabulary (in bold print) and the realization that fairly short sections are broken up further by inappropriate subheadings that seem to suggest important concepts when they really shouldn't, and this text becomes inconsiderate for reasons that have no bearing on the conceptual complexity, conceptual development, or the intent of the authors.

An examination of the conceptual statements reveals that of eighty-seven statements in this selection, eight are superordinate, thirty-three are subordinate, and forty-six are specific. Using our definitions and our evaluation of the importance of the individual statements, 53% of the statements in this selection are not essential to an understanding of the main idea(s) or the major subtopics treated in this passage. One must wonder why they are included and what students might have learned if more elaboration of the major topics and subtopics had been included.

In conclusion, this selection is conceptually considerate in that the main ideas and the supporting subtopics are expressed reasonably clearly. The text tends to focus on one idea at a time although it does seem to include too many irrelevant, non-essential details at the expense of space that could have been used to clarify the relationship between the size of the abyssal plains and the presence of trenches and rivers flowing into the respective oceans. In fact, it would seem that the text may focus too much on singular elements of the topography of the ocean floor and could have clarified the superordinate concepts and the interrelationships among the major subtopics instead of devoting so much attention to superficial discussion of lower level concepts such as guyots. As for the technical vocabulary, it seems to be used in moderation, and non-technical vocabulary is used to introduce and elaborate upon major concepts and subtopics. The text becomes inconsiderate only after the structural format features are taken into account. Whether this had an effect on the readers' comprehension is an issue that Nancy and Lyn will speculate upon in their paper; in the near future we will give both versions to another group of students and compare their comprehension.

Table 1

of the Caribbean Sea may be 26°C. Off the coast of England, it may be only 15°C.

Below the surface zone, the temperature falls very rapidly the deeper you go. This zone of rapid temperature change is known as the **thermocline** (THER-mə-klīn). The depth of the thermocline varies with the temperature of the water, the season of the year, and the flow of ocean currents. The thermocline is the transition zone between the warmer surface zone and the colder **deep zone**.

In the deep zone, the temperature declines slightly. At depths of more than 1500 meters, the temperature is usually between 4°C and 0°C. The average depth of the oceans is more than 3800 meters. Therefore, the temperature of most ocean water is just above freezing!

The three temperature zones of the open ocean are not found in the polar regions. In the Arctic and Antarctic Seas, the surface waters are very cold. The temperature changes only slightly as you go deeper.

Section Checkup

1. What is the major source of heat for the ocean?
2. What are the three temperature zones of the ocean?

Topography of the Ocean Floor

The topography of the ocean basins is different from the topography of the continents. The ocean basins have higher mountains, deeper canyons, and larger, flatter plains than the continents. The ocean basins have more volcanoes than the continents. Earthquakes occur more often under the ocean than on the land. The rock that forms the ocean basins is very different from the rock that forms the continental crust. The crust of the earth is much thinner under the oceans than under the continents.

THE EDGES OF THE CONTINENTS

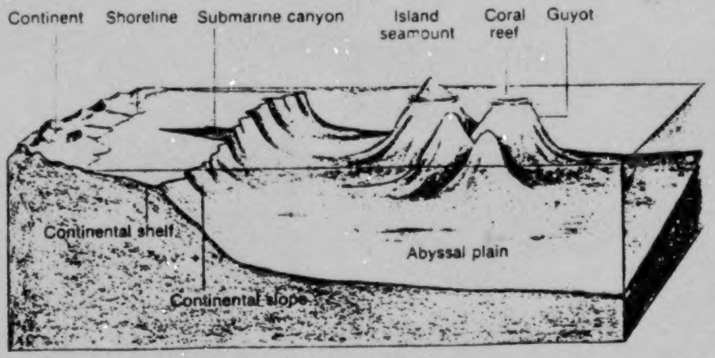
The edges of the continents, or the **continental margins**, extend into the oceans. The part of a continent between the **shoreline** and the area where the ocean floor begins a steep descent is called the **continental shelf**. The shoreline is the place where the land and ocean meet. The continental shelf slopes very gently downward from the shore around most continents. In fact, it usually slopes less than 0.3 meters every 25 meters you go away from the shoreline.

The width of the continental shelf varies. The continental shelf extends more than 200 kilometers into the ocean off the Atlantic Coast. The continental shelf extends over 1200 kilometers off the Arctic shore of Siberia. On the other hand, there is almost no continental shelf off the coast of southeastern Florida.

The waters over the continental shelves are the best fishing areas in the ocean. Large mineral deposits and deposits of oil and natural gas are also found on the continental shelves. Because of the resources the continental shelves contain, many countries of the world have extended their national boundaries to include the continental shelves off their shores.

At the edge of the continental shelf, the ocean floor plunges down steeply four to five kilometers to the

Figure 10-4. This diagram shows the varied topography of the ocean floor. What are some of the features found on the ocean floor?



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Library Investigation ◇

Ocean Explorers

Using reference materials in the library, find out about the following ocean explorers:

Auguste Piccard
Jacques-Yves Cousteau

In a written report, explain what each explorer contributed to our knowledge of the ocean.

ocean basin. This part of the ocean floor is the **continental slope**. The continental slope marks the boundary between the continental crust and the ocean basin crust. At the bottom of the continental slope, there is a large amount of sediment.

In many areas, the continental shelf and slope are cut through by **submarine canyons**. Submarine canyons are deep, V-shaped valleys that have been cut in hard rock. Some of these canyons are very deep. For example, the Monterey Submarine Canyon off central California reaches depths of over 2000 meters. It is deeper than the Grand Canyon!

Some scientists believe that submarine canyons were formed by powerful **undersea avalanches**. Undersea avalanches consist of swift-moving sediments that slide down the continental slopes. Submarine canyons may also be caused by earthquakes or other movements on the slopes. Scientists still have much to learn about the origin and nature of submarine canyons.

THE ABYSSAL PLAINS

At the bottom of the continental slope, the ocean basin begins. Scientists have discovered large flat areas in the ocean basins. These areas are called **abyssal** (ə-BIS-əl) **plains**.

The abyssal plains are larger in the Atlantic and Indian Oceans than in the Pacific Ocean. Scientists believe there are two reasons for the difference in size. First, the world's greatest rivers all flow directly or indirectly into the Atlantic and Indian Oceans. These rivers include the Mississippi, the Congo, the Amazon, and the Nile, which flow into the Atlantic Ocean. Two major rivers, the Ganges and the Indus, flow directly into the Indian Ocean. These major rivers and many smaller rivers deposit large amounts of sediments on the abyssal plains. Second, the Pacific Ocean contains a number of deep ocean **trenches**, or long, narrow cracks. These trenches act as traps for the sediments that are carried down the continental slope.

Deep-sea drilling operations and sound wave detection equipment have shown that the sediments of the

A Profile of the Ocean Floor

PROBLEM

How can scientists obtain a profile of the ocean floor?

AIM

In this investigation you will measure water depths on a model of the ocean floor. Using these measurements, you will be able to draw a profile of the model.

MATERIALS

Each group of students will need a plastic bucket, a coarse wire mesh (30 cm × 30 cm), water, dark food coloring, string, a small weight, two pieces of graph paper (30 cm × 30 cm), a metric ruler, a pencil, assorted small objects, and some clay.

PROCEDURES

1. Trace the top of your bucket on one of your pieces of graph paper.

2. Using several of the small objects and some clay, make a model of the ocean floor in the bottom of the bucket. Use clay to attach objects that may float.

3. After your model has been completed, carefully fill the bucket with water. Add dark food coloring until the objects you placed on the bottom are no longer visible.

4. Exchange your model and graph paper for those of another group of students in the class.

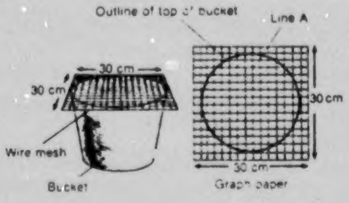
5. Place the square wire mesh over the bucket as shown in the illustration. Each square hole in the wire mesh will represent a square on your graph paper.

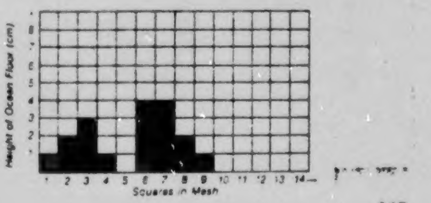
6. Tie the small weight to a piece of string 25 centimeters long. Slowly lower the string through one of the squares in the wire mesh. When the weight hits the bottom, carefully measure the amount of string remaining above the wire mesh. Subtract this amount from 25 centimeters. The remainder is the depth of water at that point. Record the result in the corresponding square on your graph paper. Repeat this for each square.

7. On the second piece of graph paper, set up a graph like the one shown here.

8. Choose a straight line of squares across the outline of the bucket on the graph paper. See line A in the illustration. Subtract the water depth recorded in the first square from 25 centimeters to find the elevation of that spot on the ocean floor. Find the elevation for each spot along the line.

9. Plot the elevations on the graph. Pour the water from the bucket. Compare the profile on your graph with the model.





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abyssal plain close to a continent consist of thick layers of mud, sand, and silt. Farther out on the abyssal plain, some of the sediments are made up of the remains of tiny organisms. These organisms can only be seen with a microscope. They form a sediment called **ooze**. Where ocean life is not abundant, the floor is covered with a different sediment called **red clay**. Red clay is composed of sediments carried to the oceans by rivers.

Seamounts and Guyots Scientists have discovered that there are many individual mountains on the ocean floor. These mountains are called **seamounts**. Seamounts are volcanic mountains that rise more than 1000 meters above the surrounding sea floor. They have steep sides leading to a narrow summit. Oceanographers have located over one thousand seamounts, but they expect to find thousands of others in the future. There are more seamounts in the Pacific Ocean than in either the Atlantic or the Indian Ocean.

Some seamounts reach above the surface of the ocean to form islands. Examples of such volcanic islands are the Azores and the Ascension Islands in the Atlantic Ocean. Perhaps the most dramatic are the Hawaiian Islands in the Pacific Ocean. The island of Hawaii is the top of a great volcano that rises over 9600 meters from the ocean floor. It is the highest mountain on the earth!

Figure 10-5. The island of Morea in Polynesia is the top of a seamount that extends above the surface of the ocean. A coral reef surrounds the island.

During World War II, it was discovered that many seamounts do not rise to a peak. Instead, they have flat tops. These flat-topped seamounts are called **guyots** (gē-ōz). Scientists believe that the flat tops were caused by wave erosion. The waves broke apart the top of the seamount that once was at sea level. The flattened volcanic seamount was later submerged.

Trenches The deepest parts of the ocean are not in the middle of the ocean floors. The greatest depths are found in trenches along the edges of ocean basins. Trenches are long, narrow crevices that can reach depths of more than 11,000 meters.

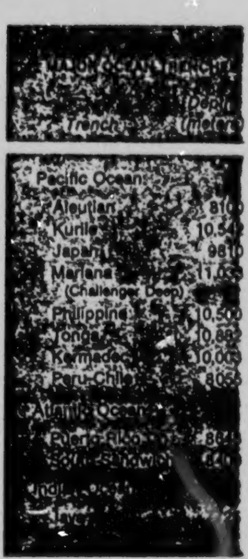
The Pacific Ocean has more trenches than the other oceans. The Mariana Trench in the Pacific Ocean contains the deepest spot known on the earth. This spot is called Challenger Deep. Challenger Deep is over 11,000 meters deep.

THE OCEAN RIDGES

Did you know that some of the largest mountain ranges on the earth are under the oceans? These mountain ranges are called **ocean ridges**. They form an almost continuous mountain belt from the Arctic Ocean, down through the middle of the Atlantic Ocean, curving into the Indian and Pacific Oceans. In the Atlantic Ocean, the belt is called the **Mid-Atlantic Ridge**. What is it called in the Pacific Ocean?

The ocean ridges are unlike any mountain range on land. Mountain ranges on land are created by the folding and compressing of the earth's crust. Many scientists believe that the ocean ridges are areas where molten material from the mantle flows up to the surface. At the surface, it cools and spreads along the sea floor to form new crust.

Running along the middle of the ocean ridges, there are deep crevices, or **rift valleys**. Rift valleys are usually one to two kilometers below the surrounding mountain peaks. Rift valleys may mark the center of the areas where new crust is formed. There are many



MAJOR OCEAN TRENCHES

Trench	Depth (meters)
Pacific Ocean	
Aleutian	8100
Kurile	10,54[illegible]
Japan	9810
Mariana (Challenger Deep)	11,0[illegible]
Philippine	10,500
Tonga	10,882
Kermadec	10,00[illegible]
Peru-Chile	805[illegible]
Atlantic Ocean	
Puerto Rico	864[illegible]
South Sandwich	84[illegible]
Indian Ocean	
Java	[illegible]

Figure 10-6. This table shows depth in meters of the major ocean trenches. In which ocean are deepest trenches located?

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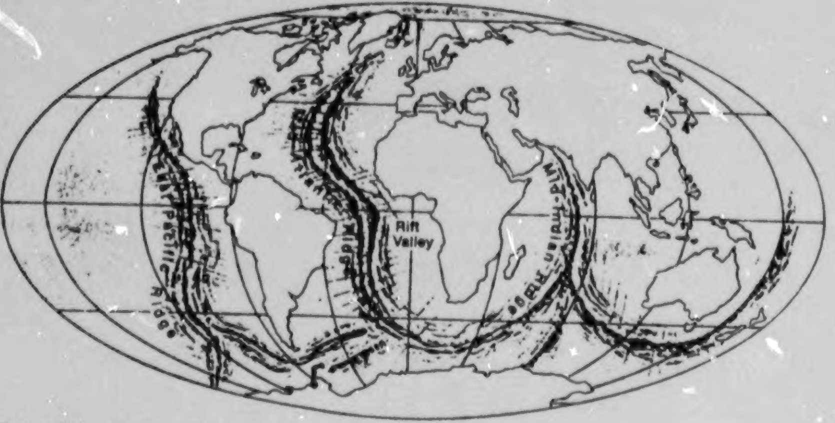

East Pacific Ridge
Mid-Atlantic Ridge
Rift Valley
Mid-Indian Ridge

Figure 10-7. On this map you can see that the ocean ridges are an almost continuous belt of volcanic mountains that extend from the Arctic Ocean into the Atlantic, Indian, and Pacific Oceans. Why is there so much volcanic and earthquake activity in the ridge areas?

earthquakes and volcanic eruptions in these areas. Scientists have learned about changes in the earth's crust by studying the rocks in and around the ocean ridges.

Section Checkup

1. How does ocean topography differ from land topography?
2. What are three features of ocean basins?
3. What is the Mid-Atlantic Ridge?

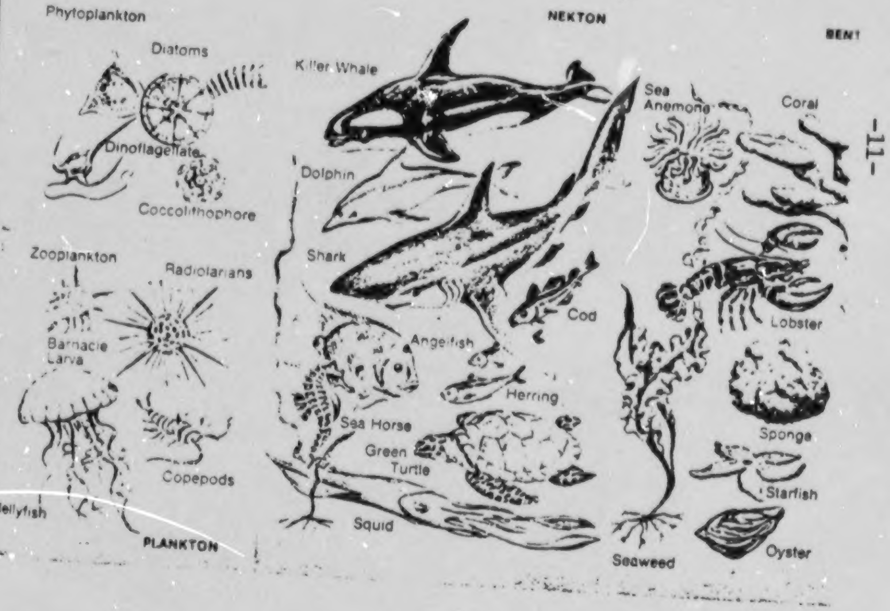
The Oceans' Life Zones

There is a wide variety of plant and animal life in the oceans. Many factors affect the kinds of life present in the oceans. One of these factors is the amount of sunlight that penetrates the environment. Another factor is temperature. As you go deeper in the ocean, there is less sunlight and the temperature is lower. Why would you find many plants in the upper parts of the ocean or near the shore?

Other factors that affect the kinds of life found in the ocean are salinity and water pressure. Water pressure increases as you go deeper in the ocean. Organisms that live deep in the ocean must be able to withstand great pressure.

The animals and plants found in the oceans can be classified into three major groups according to where they live in the ocean and their habits. The largest group of animals and plants is called **plankton** (PLANGK-tən). Plankton float at or near the surface of

Figure 10-8. Plankton, nekton, and benthos are the three major types of animals and plants found in the oceans. How do plankton and nekton differ?


Phytoplankton
Diatoms
Dinoflagellate
Coccolithophore
Zooplankton
Radiolarians
Barnacle Larva
Copepods
Jellyfish
PLANKTON
NEKTON
Killer Whale
Dolphin
Shark
Cod
Angelfish
Herring
Sea Horse
Green Turtle
Squid
BENT
Sea Anemone
Coral
Lobster
Sponge
Starfish
Seaweed
Oyster

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Topography of the Ocean Floor

Conceptual Statements Specified Hierarchically

Definitions for hierarchical levels:

Superordinate: most general concepts (main idea); concepts that extend across the entire selection

Subordinate: major subtopics which would be a main idea for a subelement of the passage (note: when a statement relates a subtopic to a main idea or to another subtopic, the statement is then classified as a superordinate concept; a statement is a subordinate concept if it meets one of the two following criteria:

a. specifies the subtopic without relating it to either the main idea or to another subtopic, or
b. specifies information essential to understanding the essence of the subtopic (e.g., a vital feature or a definition)

Specific: conceptual statements that are not essential to understanding the essence of a subtopic (e.g., examples for clarification, details of elaboration)

Note: In the following specification list, numbers to the left of the statements will designate the hierarchical levels as follows:

(1) will designate superordinate statements
(2a) will designate subordinate statements that specify the subtopic (see definitions)
(2b) will designate subordinate statements that specify information essential to understanding the subtopic (see definitions)
(3) will designate specific statements (see definitions)

Numbers to the right of the statements will designate the spatial order (e.g., where the statement was placed in the original text).

(1) The topography of the ocean basins is different from the topography of the continents. (1)

(1) The ocean basins have higher mountains, deeper canyons, and larger, flatter, plains than the continents. (2)

(1) The ocean basins have more volcanoes than the continents. (3)

(1) Earthquakes occur more often under the ocean than on the land. (4)

(1) The rock that forms the ocean basins is very different from the rock that forms the continental crust. (5)

(1) The crust of the earth is much thinner under the oceans than under the continents. (6)

(1) The edges of the continents, or the continental margins, extend into the oceans. (7)

(1) At the bottom of the continental slope, the ocean basin begins. (32)

(2a) The part of a continent between the shoreline and the area where the ocean floor begins a steep descent is called the continental shelf. (8)

(2b) The shoreline is the place where the land and ocean meet. (9)

(2b) The continental shelf slopes very gently downward from the shore around most continents. (10)

(2b) The width of the continental shelf varies. (12)

(3) In fact, it usually slopes less than 0.3 meters every 25 meters you go away from the shoreline (11)

(3) The continental shelf extends more than 200km into the ocean off the Atlantic Coast. (13)

(3) The continental shelf extends over 1200km off the Arctic shore of Siberia. (14)

(3) On the other hand, there is almost no continental shelf off the coast of southeastern Florida. (15)

(3) The waters over the continental shelves are the best fishing areas in the ocean. (16)

(3) Large mineral deposits and deposits of oil and natural gas are also found on the continental shelves. (17)

(3) Because of the resources the continental shelves contain, many countries of the world have extended their natural boundaries to include the continental shelves off their shores. (18)

(2a) At the edge of the continental shelf, the ocean floor plunges down steeply four to five kilometers to the ocean basin. (19)

(2a) This part of the ocean floor is the continental slope. (20)

(2b) The continental slope marks the boundary between the continental crust and the ocean basin crust. (21)

(2b) At the bottom of the continental slope, there is a large amount of sediment.

(2b) In many areas, the continental shelf and slope are cut through by submarine canyons. (23)

(2b) Some scientists believe that submarine canyons were formed by powerful undersea avalances. (28)

(3) Submarine canyons are deep, V-shaped valleys that have been cut in hard rock. (24)

(3) Some of these canyons are very deep. (25)

(3) For example, the Monterey Submarine Canyon off central California reaches depths of over 2000 meters. (26)

(3) It is deeper than the Grand Canyon! (27)

(3) Undersea avalanches consist of swift-moving sediments that slide down the continental slopes. (29)

(3) Submarine canyons may also be caused by earthquakes or other movements on the slopes. (30)

(3) Scientists still have much to learn about the origin and nature of submarine canyons. (31)

(2a) Scientists have discovered large flat areas in the ocean basins. (33)

(2a) These areas are called abyssal plains. (34)

(2b) The abyssal plains are larger in the Atlantic and Indian Oceans than in the Pacific Ocean. (35)

(2b) These major rivers and many smaller rivers deposit large amounts of sediments on the abyssal plains. (40)

(2b) Second, the Pacific Ocean contains a number of deep ocean trenches, or long, narrow cracks. (41)

(2b) These trenches act as traps for the sediments that are carried down the continental slope. (42)

(2b) Deep-sea drilling operations and sound wave detection equipment have shown that the sediments of the abyssal plain close to a continent consist of thick layers of mud, sand, and silt. (43)

(3) Scientists believe there are two reasons for the difference in size. (36)

(3) First, the world's greatest rivers all flow directly or indirectly into the Atlantic and Indian Oceans. (37)

(3) These rivers include the Mississippi, the Congo, the Amazon, and the Nile, which flow into the Atlantic Ocean. (38)

(3) Two major rivers, the Ganges and the Indus, flow directly into the Indian Ocean. (39)

(3) Further out on the abyssal plain some of the sediments are made up of the remains of tiny organisms. (44)

(3) These organisms can only be seen with a microscope. (45)

(3) They form a sediment called ooze. (46)

(3) Where ocean life is not abundant, the floor is covered with a different sediment called red clay. (47)

(3) Red clay is composed of sediments carried to the oceans by rivers. (48)

(2a) Scientists have discovered that there are many individual mountains on the ocean floor. (49)

(2a) These mountains are called seamounts. (50)

(2b) Seamounts are volcanic mountains that rise more than 1000 meters above the surrounding sea floor. (51)

(2b) There are more seamounts in the Pacific Ocean than in either the Atlantic or the Indian Ocean. (55)

(2b) Some seamounts reach above the surface of the ocean to form islands. (56)

(3) They have steep sides leading to a narrow summit. (52)

(3) Oceanographers have located over one thousand seamounts. (53)

(3) They expect to find thousands of others in the future. (54)

(3) Examples of such volcanic islands are the Azores and the Ascension Islands in the Atlantic Ocean. (58)

(3) Perhaps the most dramatic are the Hawaiian Islands in the Pacific Ocean. (58)

(3) The island of Hawaii is the top of a great volcano that rises over 9600 meters from the ocean floor. (59)

(3) It is the highest mountain on the earth. (60)

(3) During World War II, it was discovered that many seamounts do not rise to a peak. (61)

(3) Instead, they have flat tops. (62)

(3) These flat-topped seamounts are called guyots. (63)

(3) Scientists believe that the flat tops were caused by wave erosion. (64)

(3) The waves broke apart the top of the seamount that once was at sea level. (65)

(3) The flattened volcanic seamount was later submerged. (66)

(2a) The deepest parts of the ocean are not in the middle of the ocean floors. (67)

(2a) The greatest depths are found in trenches along the edges of ocean basins. (68)

(2b) Trenches are long, narrow crevices that can reach depths of more than 11,000 meters. (69)

(2b) The Pacific Ocean has more trenches than the other oceans. (70)

(3) The Mariana Trench in the Pacific Ocean contains the deepest spot known on the earth. (71)

(3) This spot is called Challenger Deep. (72)

(3) Challenger Deep is over 11,000 meters deep. (73)

(2a) Did you know that some of the largest mountain ranges on the earth are under the oceans? (74)

(2a)These mountain ranges are called ocean ridges. (75)

(2b) They form an almost continuous mountain belt from the Arctic Ocean, down through the middle of the Atlantic Ocean, curving into the Indian and Pacific Oceans.

(2b) The ocean ridges are unlike any mountain ranges on land. (79)

(2b) Many scientists believe that the ocean ridges are areas where molten material from the mantle flows up to the surface. (81)

(2b) At the surface, it cools and spreads along the sea floor to form a new crust. (82)

(2b) Running along the middle of the ocean ridges, there are deep crevices, or rift valleys. (83)

(3) In the Atlantic Ocean, the belt is called the Mid-Atlantic Ridge. (77)

(3) What is it called in the Pacific Ocean? (78)

(3) Mountain ranges on land are created by the folding and compressing of the earth's crust. (80)

(3) Rift valleys are usually one to two kilometers below the surrounding mountain peaks. (84)

(3) Rift valleys may mark the center of the areas where new crust is formed. (85)

(3) There are many earthquakes and volcanic eruptions in these areas. (86)

(3) Scientists have learned about changes in the earth's crust by studying the rocks in and around the ocean ridges. (87)

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Analysis of Adolescents' Ratings of Text: Familiarity and Importance

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In the particular event being discussed in this series of papers, eighth grade students in an earth science class were asked to perform one of a variety of tasks after reading a particular piece of text. In this paper, I will describe one of these tasks, the rating of the conceptual statements in the text by the students and the teacher according to familiarity and importance.

Estes & Shebilske (1980) found that early adolescents tended to remember what was already somewhat familiar to them when reading expository material but that college students tended to remember what they considered to be important when reading expository material. Our current project is, in part, an exploration of that finding. To accomplish this, we asked students to rate the conceptual statements from the passage called "Topography of the Ocean Floor" from the textbok by Coble, Murray, and Rice (1981, 244-250). These statements were typed in the list format mentioned in the previous paper. This listing of conceptual statements is reproduced in Appendix A following this paper and consists of intact sentences taken from the actual textbook and typed in list format without headings, bold print, or graphics. Each student was asked to rate each conceptual statement twice, once according to how familiar the ideas were to the students before reading and once according to how important the student thought each idea was.

By analyzing these ratings, we hoped to achieve some insight into any relationship that might exist between the familiarity of ideas in the text and the perceived importance of those ideas in this particular event. In the next paper, we will examine another possible relationship, that being the relationship between the perceived familiarity and importance of ideas and the recall of those ideas immediately after reading.

Twenty-one students rated the eighty-seven conceptual units. The different ratings received point values as shown in Table One. These point values were averaged for each conceptual unit to produce average student ratings for familiarity and importance for each unit. Similar ratings were done by the regular teacher of the earth science class, showing his opinion of what was important and of what he thought his students would be familiar or unfamiliar with.

Table One. Point Values for Rating of Conceptual Units.

Very sure it's familiar	6	Very sure it's important	6
Kind of sure it's familiar	5	Kind of sure it's important	5
Not sure it's familiar	4	Not sure it's important	4
Not sure it's not familiar	3	Not sure it's not important	3
Kind of sure it's not familiar	2	Kind of sure it's not important	2
Very sure it's not familiar	1	Very sure it's not important	1

Analysis of these ratings proved interesting and somewhat surprising. Table 2, reproduced in Appendix B following this article, shows the ratings. There appeared to be little relationship between what students said they were familiar with before reading the text and what they identified as important. Of the ten items rated most important by the students, only one received a familiarity rating above 4 on the 6 point scale described earlier (see Table Two). Of these same items, two are classified hierarchically at the superordinate level (see Appendix B, J. Vaughan, this issue). These are the first two sentences of the text of this passage and give a general introduction to the topic of the topography of the ocean basins and its features. Three items, dealing with the definitions of continental slope and seamounts, are classified at the subordinate level. The remaining five of the ten concepts rated most important are classified at the specific level. These five items contain a variety of detailed information not essential to understanding the whole passage but are still rated as quite important by the students. Statement #13 tells us that the continental shelf extends more than 200 km. into the ocean off the Atlantic coast. Other statements deal with the mineral, oil, and gas deposits found on the continental shelves--items much in the news today and so logically considered important by the students. The remaining statements give details about rift valleys and the earthquakes and volcanoes that occur there. The content of all these ten items rated as most important by the students seem to lend additional credence to the notion that students read for definitions and details.

Approaching this data from the ten items rated as least important before reading by the students, we find a similar situation. Of these ten conceptual units, again only one received a familiarity rating above 4. One item is classified as being at the superordinate level and deals with the rock that forms the continental crust and the ocean basins. Again, three items are classified at the subordinate level. Of these, two deal with the slope and width of the continental shelf. The other, which was the one unit receiving a high familiarity rating, deals with the mountain ranges under the oceans. The remaining six items are at the specific level and contain detailed information about seamounts and guyots (flat-topped seamounts), about the depth of a submarine canyon, and about the fishing over the continental shelves. These non-essential detail items appear in content to be quite similar to those rated as very important, but are rated as least important. The reasons for this distinction are not clear from the data collected on this particular event.

Further illustration of this familiarity-importance relationship, or lack of relationship, is found in the conceptual statements rated as most and least familiar before reading by the students. To clarify this, I have chosen items with an average student familiarity rating of 4.0 or higher as the most familiar conceptual statements. These items are denoted on Table Two by an asterisk (*) following their familiarity ratings. Of these eight items, one is classified at the superordinate level and describes the crust of the earth under the continents and under the oceans. Five statements rated very familiar are classified as subordinate. These include a defintion of shoreline and information about seamounts and ocean basins. One of these items (#74) was rated as one of the ten least important items by the students. This item gives what may be important information but in the form of a question, "Did you know that some of the largest mountain ranges on the earth are under the oceans?". It seems that students are saying that they know the ranges are under the ocean, but that it is unimportant that they already know it! The other two most familiar statements are at the specific level. One of these lists the major rivers that flow into the Atlantic Ocean, including the Mississippi, the Congo, the Amazon, and the Nile. This information, although specific, is likely to have been covered several times in the earlier school careers of many students. The other specific item rated as very familiar is the last conceptual statement of the selection and was rated as one of the ten most important statements by the students. This item involves changes in the earth's crust, a topic dealt with in an earlier chapter of this same textbook.

An examination of the items receiving the lowest familiarity ratings, shows that there are nine conceptual statements rated 2.2 or lower by the students. These items are denoted on Table Two by an "at sign" (@) following the familiarity ratings. Of these nine items, there are none rated at the superordinate level and only one at the subordinate level. This statement involves the formation of submarine canyons by undersea avalanches and was rated as moderately important. All eight remaining statements of those listed as least familiar are at the specific level. Two of these are rated as fairly important (4.1 and 4.4) and both contain "number" detail such as "slopes less than 0.3 meters every 25 meters," again providing support for the statement that students read for detail. One item (#26) is rated as one of the ten least important concepts and tells the depth of the Monterey Submarine Canyon. It is not apparent why the number detail of this item is not considered important by the students. The five remaining specific level concepts are rated as moderately important and deal with the deepest known spot on earth, with the continental shelf off Florida, and with guyots.

Analysis of the importance and familiarity ratings done by the teacher of this class of students revealed similar inconsistencies. The teacher rated seventy-one of the eighty-seven conceptual statements as very important and the remaining sixteen units as very unimportant. He did not use any of the four intermediate ratings available to him. Of the eight superordinate items, seven were rated as important by the teacher and one was rated unimportant, dealing with the extension of the continental margins into the oceans. Of the thirty-three subordinate concepts, the teacher rated thirty-one as important and two as unimportant. These items deals with the continuous mountain belt through the oceans. Of the forty-six specific level items, the teacher rated thirty-three as important and thirteen as unimportant. These included several number detail items, information about the continental shelf, tiny sea organisms, and an example of seamount islands. Although this teacher rated most of the superordinate and subordinate concepts as important, he also rated most of the specific items as important. This may illuminate why the students rated so many specific items as important--because they know their teacher does!

The teacher also completed familiarity ratings for the conceptual statements according to how familiar he thought his students would be with the concepts before reading. A comparison of the teacher's familiarity ratings with those done by the students is revealing. The teacher indicated that he was very sure that the students would be very unfamiliar with seventy-one of the eighty-seven conceptual statements in the selection. Table Two shows that he also rated seventy-one items as very important. Although not all seventy-one items in each category are the same, there is necessarily a large overlap. In other words, the teacher rated many items as both very important and very unfamiliar to the students. However, Table Two also shows that the students themselves felt substantially more familiar with many of the concepts than the teacher seemed to realize. They said only eight items were quite unfamiliar (all eight were rated as very unfamiliar by the teacher, too). Of the seventy-one items rated by the teacher as very unfamiliar to the students, six were at the superordinate level, twenty-five at the subordinate level, and forty at the specific level.

Of the sixteen items rated as familiar or somewhat familiar by the teacher, four were among those rated as most familiar by the students. These included the definition of shoreline and the discussion of the thickness of the crust of the earth mentioned earlier in this paper. Two of these sixteen items are at the superordinate level, eight at the subordinate level, and six at the specific level.

The teacher also provided us with the test he planned to use to evalute the students following their study of this text selection. The test consists of nine true/false items and two short discussion questions, involving twenty-three of the eighty-seven conceptual statements in the text. Of these, four conceptual statements were rated as superordinate and the students rated two of these as very important and two as moderately important. Six subordinate concepts were included in test items and students rated all of these as moderately important. Thirteen specific concepts were tested and students rated two of these as very important (the oil and gas of the continental shelves again), ten as moderately important, and one as the least important of all the concepts in the selection (the fishing over the continental shelves). Apparently, the students are fairly good at picking out items that might be included on the teacher's test, although they rated many more as important than they were actually tested on, as did the teacher.

Looking back over all these various analyses, several points seem to reoccur in various ways. It must be emphasized here that this is only one event, therefore generalizations to other situations are not advised. Nonetheless, certain generalizations specific to this one event have emerged and are listed below:

1. There appears to be no consistent relationship between what students were familiar with before reading and what they considered to be important.

2. Students seemed to be somewhat confused about what is and is not important.

3. The teacher makes few distinctions in importance among the concepts.

4. The teacher seems to be making invalid assumptions about the background knowledge the students possess before reading the text.

The implications of these generalizations could be quite important if they are born out by analysis of other events. If students are confused about what is important and teachers make few distinctions in the importance of concepts, it seems unlikely that the truly main idea/superordinate level concepts will be emphasized over the less important detail/specific level concepts. Further, if teachers are making invalid assumptions about students' prior knowledge, they will be unable to accurately judge where and at what level to start their lessons to best help students learn. This, coupled with the inconsiderate text so often found in schools, might well be a critical factor in students' failure to learn from what they read. We may know more after we complete our analysis of the other events examined in this project.

APPENDIX A

	Did you know this before you read it?		How sure are you of your answer?		
1. The topography of the ocean basins is different from the topography of the continents.	YES	NO	VERY SURE	KINDA SURE	NOT SURE
2. The ocean basins have higher mountains, deeper canyons, and larger, flatter plains than the continents.	YES	NO	VS	KS	NS
3. The ocean basins have more volcanoes than the continents.	YES	NO	VS	KS	NS
4. Earthquakes occur more often under the ocean than on the land.	YES	NO	VS	KS	NS
5. The rock that forms the ocean basins is very different from the rock that forms the continental crust.	YES	NO	VS	KS	NS
6. The crust of the earth is much thinner under the oceans than under the continents.	YES	NO	VS	KS	NS
7. The edges of the continents, or the continental margins, extend into the oceans.	YES	NO	VS	KS	NS
8. The part of a continent between the shoreline and the area where the ocean floor begins a steep descent is called the continental shelf.	YES	NO	VS	KS	NS
9. The shoreline is the place where the land and ocean meet.	YES	NO	VS	KS	NS
10. The continental shelf slopes very gently downward from the shore around most continents.	YES	NO	VS	KS	NS
11. In fact, it usually slopes less than 0.3 meters every 25 meters you go away from the shoreline.	YES	NO	VS	KS	NS

	Did you know this before you read it?		How sure are you of your answer?		
12. The width of the continental shelf varies.	YES	NO	VS	KS	NS
13. The continental shelf extends more than 200 km. into the ocean off the Atlantic coast.	YES	NO	VS	KS	NS
14. The continental shelf extends over 1200 km. off the Arctic shore of Siberia.	YES	NO	VS	KS	NS
15. On the other hand, there is almost no continental shelf off the coast of southeastern Florida.	YES	NO	VS	KS	NS
16. The waters over the continental shelves are the best fishing areas in the ocean.	YES	NO	VS	KS	NS
17. Large mineral deposits and deposits of oil and natural gas are also found on the continental shelves.	YES	NO	VS	KS	NS
18. Because of the resources the continental shelves contain, many countries of the world have extended their national boundaries to include the continental shelves off their shores.	YES	NO	VS	KS	NS
19. At the edge of the continental shelf, the ocean floor plunges down steeply four to five kilometers to the ocean basin.	YES	NO	VS	KS	NS
20. This part of the ocean floor is the continental slope.	YES	NO	VS	KS	NS
21. The continental slope marks the boundary between the continental crust and the ocean basic crust.	YES	NO	VS	KS	NS
22. At the bottom of the continental slope, there is a large amount of sediment.	YES	NO	VS	KS	NS
23. In many areas, the continental shelf and slope are cut through by submarine canyons.	YES	NO	VS	KS	NS

	Did you know this before you read it?		How sure are you of your answer?		
24. Submarine canyons are deep, V-shaped valleys that have been cut in hard rock.	YES	NO	VS	KS	NS
25. Some of these canyons are very deep.	YES	NO	VS	KS	NS
26. For example, the Monterey Submarine Canyon off central California reaches depths of over 2000 meters.	YES	NO	VS	KS	NS
27. It is deeper than the Grand Canyon!	YES	NO	VS	KS	NS
28. Some scientists believe that submarine canyons were formed by powerful undersea avalances.	YES	NO	VS	KS	NS
29. Undersea avalanches consist of swift-moving sediments that slide down the continental slopes.	YES	NO	VS	KS	NS
30. Submarine canyons may also be caused by earthquakes or other movements on the slopes.	YES	NO	VS	KS	NS
31. Scientists still have much to learn about the origin and nature of submarine canyons.	YES	NO	VS	KS	NS
32. At the bottom of the continental slope, the ocean basin begins.	YES	NO	VS	KS	NS
33. Scientists have discovered large flat areas in the ocean basins.	YES	NO	VS	KS	NS
34. These areas are called abyssal plains.	YES	NO	VS	KS	NS
35. The abyssal plains are larger in the Atlantic and Indian Oceans than in the Pacific Ocean.	YES	NO	VS	KS	NS
36. Scientists believe there are two reasons for the difference in size.	YES	NO	VS	KS	NS
37. First, the world's greatest rivers all flow directly or indirectly into the Atlantic and Indian Oceans.	YES	NO	VS	KS	NS

	Did you know this before you read it?		How sure are you of your answer?		
38. These rivers include the Mississippi, the Congo, the Amazon, and the Nile, which flow into the Atlantic Ocean.	YES	NO	VS	KS	NS
39. Two major rivers, the Ganges and the Indus, flow directly into the Indian Ocean.	YES	NO	VS	KS	NS
40. These major rivers and many smaller rivers deposit large amounts of sediments on the abyssal plains.	YES	NO	VS	KS	NS
41. Second, the Pacific Ocean contains a number of deep ocean trenches, or long, narrow cracks.	YES	NO	VS	KS	NS
42. These trenches act as traps for the sediments that are carried down the continental slope.	YES	NO	VS	KS	NS
43. Deep-sea drilling operations and sound wave detection equipment have shown that the sediments of the abyssal plain close to a continent consist of thick layers of mud, sand, and silt.	YES	NO	VS	KS	NS
44. Further out on the abyssal plain some of the sediments are made up of the remains of tiny organisms.	YES	NO	VS	KS	NS
45. These organisms can only be seen with a microscope.	YES	NO	VS	KS	NS
46. They form a sediment called ooze.	YES	NO	VS	KS	NS
47. Where ocean life is not abundant, the floor is covered with a different sediment called red clay.	YES	NO	VS	KS	NS
48. Red clay is composed of sediments carried to the oceans by rivers.	YES	NO	VS	KS	NS
49. Scientists have discovered that there are many individual mountains on the ocean floor.	YES	NO	VS	KS	NS

	Did you know this before you read it?		How sure are you of your answer?		
50. These mountains are called seamounts.	YES	NO	VS	KS	NS
51. Seamounts are volcanic mountains that rise more than 1000 meters above the surrounding sea floor.	YES	NO	VS	KS	NS
52. They have steep sides leading to a narrow summit.	YES	NO	VS	KS	NS
53. Oceanographers have located over one thousand seamounts.	YES	NO	VS	KS	NS
54. They expect to find thousands of others in the future.	YES	NO	VS	KS	NS
55. There are more seamounts in the Pacific Ocean than in either the Atlantic or the Indian Ocean.	YES	NO	VS	KS	NS
56. Some seamounts reach above the surface of the ocean to form islands.	YES	NO	VS	KS	NS
57. Examples of such volcanic islands are the Azoras and the Ascension Islands in the Atlantic Ocean.	YES	NO	VS	KS	NS
58. Perhaps the most dramatic are the Hawaiian Islands in the Pacific Ocean.	YES	NO	VS	KS	NS
59. The island of Hawaii is the top of a great volcano that rises over 9600 meters from the ocean floor.	YES	NO	VS	KS	NS
60. It is the highest mountain on the earth.	YES	NO	VS	KS	NS
61. During World War II, it was discovered that many seamounts do not rise to a peak.	YES	NO	VS	KS	NS
62. Instead, they have flat tops.	YES	NO	VS	KS	NS
63. These flat-topped seamounts are guyots.	YES	NO	VS	KS	NS
64. Scientists believe that the flat tops were caused by wave erosion.	YES	NO	VS	KS	NS

	Did you know this before you read it?		How sure are you of your answer?		
65. The waves broke apart the top of the seamount that once was at sea level.	YES	NO	VS	KS	NS
66. The flattened volcanic seamount was later submerged.	YES	NO	VS	KS	NS
67. The deepest parts of the ocean are not in the middle of the ocean floors.	YES	NO	VS	KS	NS
68. The greatest depths are found in trenches along the edges of ocean basins.	YES	NO	VS	KS	NS
69. Trenches are long, narrow crevices that can reach depths of more than 11,000 meters.	YES	NO	VS	KS	NS
70. The Pacific Ocean has more trenches than the other oceans.	YES	NO	VS	KS	NS
71. The Mariana Trench in the Pacific Ocean contains the deepest spot known on the earth.	YES	NO	VS	KS	NS
72. This spot is called Challenger Deep.	YES	NO	VS	KS	NS
73. Challenger Deep is over 11,000 meters deep.	YES	NO	VS	KS	NS
74. Did you know that some of the largest mountain ranges on the earth are under the oceans?	YES	NO	VS	KS	NS
75. These mountain ranges are called ocean ridges.	YES	NO	VS	KS	NS
76. They form an almost continuous mountain belt from the Arctic Ocean, down through the middle of the Atlantic Ocean, curving into the Indian and Pacific Oceans.	YES	NO	VS	KS	NS
77. In the Atlantic Ocean, the belt is called the Mid-Atlantic Ridge.	YES	NO	VS	KS	NS
78. What is it called in the Pacific Ocean?	YES	NO	VS	KS	NS
79. The ocean ridges are unlike any mountain ranges on land.	YES	NO	VS	KS	NS

	Did you know this before you read it?		How sure are you of your answer?		
80. Mountain ranges on land are created by the folding and compressing of the earth's crust.	YES	NO	VS	KS	NS
81. Many scientists believe that the ocean ridges are areas where molten material from the mantle flows up to the surface.	YES	NO	VS	KS	NS
82. At the surface, it cools and spreads along the sea floor to form a new crust.	YES	NO	VS	KS	NS
83. Running along the middle of the ocean ridges, there are deep crevices, or rift valleys.	YES	NO	VS	KS	NS
84. Rift valleys are usually one to two kilometers below the surrounding mountain peaks.	YES	NO	VS	KS	NS
85. Rift valleys may mark the center of the areas where new crust is formed.	YES	NO	VS	KS	NS
86. There are many earthquakes and volcanic eruptions in these areas.	YES	NO	VS	KS	NS
87. Scientists have learned about changes in the earth's crust by studying the rocks in and around the ocean ridges.	YES	NO	VS	KS	NS

Appendix B

Table Two

Conceptual statements in order of importance as rated by students and comparison to familiarity ratings, hierarchical levels, teacher ratings and teacher test items.

	STUDENT			TEACHER		
CONCEPT #	IMPOR.	FAMIL.	LEVEL	IMPOR.	FAMIL.	TEST
1	5.3	3.5	super	6	5	1
20	5.3	3.2	sub-a	6	1	
18	5.2	2.8	spec	6	1	12
17	5.0	3.4	spec	6	6	12
2	4.9	3.5	super	6	1	1,7
86	4.9	2.9	spec	6	1	
50	4.7	3.3	sub-a	6	1	
21	4.7	2.7	sub-b	6	1	
87	4.7	4.7*	spec	6	2	
13	4.6	2.3	spec	1	1	
80	4.6	3.6	spec	6	6	8
59	4.5	2.8	spec	6	1	7
41	4.5	2.8	sub-b	6	1	6
34	4.4	2.5	sub-a	6	1	
40	4.4	2.3	sub-b	6	5	6
51	4.4	2.9	sub-b	6	1	
76	4.4	3.0	sub-b	1	1	
77	4.4	3.3	spec	6	1	
28	4.4	1.9@	sub-b	6	1	
11	4.4	2.1@	spec	1	1	
35	4.4	2.3	sub-b	6	1	6
36	4.4	2.3	spec	6	1	6
37	4.4	3.9	spec	6	5	6
29	4.3	2.8	spec	6	1	
3	4.3	2.6	super	6	1	
4	4.3	3.6	super	6	1	2
39	4.3	3.4	spec	6	1	6
58	4.3	3.7	spec	6	4	
30	4.3	2.8	spec	6	1	
52	4.3	2.9	spec	6	1	
42	4.3	2.5	sub-b	6	1	
85	4.2	2.3	spec	6	1	
38	4.2	4.3*	spec	6	1	6
47	4.2	3.2	spec	6	1	
68	4.2	3.8	sub-a	6	1	
75	4.2	3.7	sub-a	6	1	
14	4.1	1.9@	spec	1	1	
84	4.1	2.5	spec	1	1	
19	4.1	3.2	sub-a	6	1	
44	4.1	3.4	spec	6	1	
56	4.1	4.4*	sub-b	6	5	

	STUDENT			TEACHER		
CONCEPT #	IMPOR.	FAMIL.	LEVEL	IMPOR.	FAMIL.	TEST
64	4.0	2.4	spec	6	1	
23	4	2.7	sub-b	6	1	
46	4	3	spec	6	1	
49	4	4.3*	sub-a	6	6	
81	3.9	3.3	sub-b	6	1	8
83	3.9	2.8	sub-b	6	1	
6	3.9	5.0*	super	6	5	10
43	3.9	2.5	sub-b	6	1	
60	3.9	2.8	sub-b	6	1	7
69	3.9	2.4	sub-b	6	1	
9	3.8	5.5*	sub-b	6	5	3
32	3.8	3.7	super	6	1	
33	3.8	4.0*	sub-a	6	1	
48	3.8	3.3	spec	6	1	
63	3.8	2.2@	spec	6	1	
57	3.8	2.5	spec	1	1	
65	3.8	2.4	spec	6	1	
72	3.8	2@	spec	1	1	
73	3.8	1.5	spec	1	1	
24	3.7	3.3	spec	1	1	
45	3.7	3.5	spec	1	1	
82	3.7	3.3	sub-b	6	1	8
67	3.7	3.5	sub-a	1	1	
27	3.6	2.2@	spec	6	1	4
8	3.6	3.0	sub-a	6	4	
53	3.6	2.3	spec	1	1	
66	3.6	2.3	spec	6	1	
71	3.6	2.1@	spec	6	1	
22	3.5	3.4	sub-b	6	1	
31	3.5	3.7	spec	6	1	
78	3.5	2.4	spec	6	1	
79	3.5	3.6	sub-b	6	1	
70	3.4	2.9	sub-b	6	1	
25	3.4	3.8	spec	6	1	4
7	3.4	3.8	super	1	1	
55	3.4	2.8	sub-b	6	1	
5	3.3	3.8	super	6	1	
54	3.3	2.8	spec	6	1	
61	3.3	2.5	spec	1	1	
26	3.2	2.2@	spec	1	1	4
10	3.0	3.6	sub-b	6	5	
62	3	3.4	spec	6	1	
74	2.9	4.2*	sub-a	6	4	
15	2.7	2.1@	spec	1	1	
12	2.7	3.9	sub-b	6	5	
16	2.6	3.1	spec	6	5	11,12

Note: * Items with familiarity ratings of 4.0 or higher.

@ Items with familiarity ratings of 2.2 or lower.

Items in the TEST column are the numbers of the test items from the teacher's test.

For an explanation of the meanings of the terms in the LEVEL column, see J. Vaughan, this issue.

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On Adolescents' Comprehension: Perspectives from an Earth Science Assignment

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In the two preceding papers in this monograph, we have tried to explicate the project that we have undertaken and to describe the text and the familiarity and importance of the concepts as perceived by the readers and the teacher. In this paper, we will seek to describe what we understand of the students' comprehension of this passage, "Topography of the Ocean Floor," and then to explain what we think it might suggest about adolescents' comprehension. We assessed these readers' comprehension using free retellings in one class (N=18) and a series of cued-response comprehension questions in another class (N=24).

The students who provided free retellings of this selection were given several sheets of plain paper when each indicated that he/she had completed studying the selection. The students were not told the format of the assessment procedure until they completed their study. At the top of the first page on which the retelling was given, the directions read, "Tell as much as you can about the selection you just read." Students then wrote out their retellings without referring back to the text.

Our first task in the analysis of the retellings was to identify the conceptual statements included in each retelling. This was done by numbering each of the concepts within each retelling; in many cases these corresponded to identifiable sentences in the retelling. Each of the student's concepts were then classified according to its hierarchical conceptual level using the information provided in the text as a guide. Each of the student's concepts were also traced to the conceptual statements in the text, when such a link was possible as it was in most instances, so that we could determine what concepts in the text were being recalled with the greatest frequency.

As might be expected, we received a wide range of information among the retellings. The results are included in Table One. As is clear from this table, many students fared rather poorly with this selection. Of the 182 statements included in all of the retellings, only 27 were of a superordinate nature, 76 were subordinate, and 79 were specific. It would seem, then, that many of these students tended to focus on portions of the selection (e.g., subtopics) and the corresponding detailed information. To amplify this data, let us share several examples of these retellings.

Table One

Tabulation of Retellings for "Topography of the Ocean Floor"

	# of concepts	superordinate	subordinate	specific
	29	4	11	14
	22	6	6	10
*	17	3	6	8
	16	1	8	7
	16	1	7	8
	16	2	10	4
	12	2	6	4
*	10	1	3	6
	7	0	0	7
	7	2	5	0
	6	0	4	2
	5	0	2	3
	4	0	4	0
	4	2	1	1
	3	0	0	3
*	3	0	1	2
	3	1	2	0
	2	2	0	0
Total	182	27	76	79
%		.15	.42	.43

* Sample retellings included in paper

First, let us share one of the better retellings. The numbers in parentheses designate the concepts we delineated in the student's retelling.

> (1)The area between the shoreline and the place where there is a large drop is the continental shelf. (2)The ocean floor has mountains.--very different from the continental mountains-- called ocean ridges. (3)These ridges have deep crevices called rift valleys. (4)There are many earthquakes in the ocean. (5)The ocean's crust is much thinner than that of the continent. (6)The continental shelves may reach out to about 200 meters from the shoreline. (7)Although the Florida coast has no extension of the continental shelf. (8)Abyssal Plains are large flat plains along the ocean floor. (9)Seamounts are individual mountains on the ocean floor. (10)They are steep and have a narrow summit. (11)Hawaii is the largest seamount. (12)It reaches up to 11,000 meters. (13)It is a volcano. (14)Trenches are deep crevices. (15)There are some canyons as deep as 2200 meters--(16)deeper than the Grand Canyon. (17)There are more volcanoes.

A second retelling is representative of those in the middle of our range.

> (1)The shoreline is the line between the water and land. (2)The continental shelf is the land that extends in the ocean until the drop-off or continental slope. (3)Submarine canyons are deep trenches in a ridge under the ocean. (4)One of these submarine canyons in California is deeper than the Grand Canyon. (5)There are lots of mountains, plains, and volcanoes under the ocean. (6)In fact, Hawaii is the top of one of the volcanoes. (7)The volcano is 9600 meters tall, (8)this is the tallest volcano on the earth. (9)There are undersea avalanches that form when the sediments in the ocean start sliding. (10)There are also mountain ranges underneath the ocean.

A third retelling is from a student who represents the bottom third of our sample.

> (1)individual mountains on the ocean floor are called seamounts.
> (2)The oceans have higher mountains, deeper canyons, and more plains than continents.
> (3)Trenches are long narrow cracks.

A second form of comprehension assessment used in this project was a set of eighteen cued-response questions. These questions were designed to elicit comprehension of concepts at each of the three designated conceptual levels (i.e., superordinate, subordinate, and specific) while simultaneously assessing prior knowledge of certain important concepts not explained in the text (e.g., what is topography, what is crust, what is erosion), information explicitly stated in the text, and inferences that might be drawn by a reader after studying this text. The questions were administered to one of the classes after they had read the passage and students wrote out their answers below each of these short answer questions. No time limit was imposed on this task. Students were told to get their copy of the questions when they had finished studying the selection. Several features of these results are interesting and will be discussed.

The first issue we addressed was whether any differences were identifiable in the readers' comprehension across the three conceptual levels. To probe this question, we first grouped the questions according to the conceptual levels.

The superordinate questions were as follows:

1. What are continents?
2. What is meant by topography?
3. How does ocean topography differ from land topography?
4. What are the major topographical features found under the ocean?
5. Why are scientists interested in ocean topography?
6. What are the major differences in the topography of the Atlantic and Pacific Oceans?

The subordinate questions were as follows:

1. What are ocean ridges, and what are rift valleys?
2. What is sediment?
3. How does the continental shelf differ from the continental slope?
4. How could undersea avalanches cause the formation of submarine canyons?
5. Explain what scientists mean by "crust".
6. The text says that the crust of the earth is much thinner under the oceans than under the land. How would a thin crust affect the topography of the ocean?

The specific questions were as follows:

1. Describe seamounts.
2. What two reasons are given that explain why the abyssal plains are larger in the Indian Ocean than the Pacific Ocean?
3. Where ocean life is not abundant, the ocean floor is covered with red clay. What does red clay have to do with whether ocean life is abundant or not?

4. Describe what is meant by "erosion".
5. If rift valleys do indeed mark the center of areas where new crust is formed, how would this new formation occur?
6. In terms of topography, what does "summit" mean?

In examining the student responses to the 18 questions, we rated the quality of each answer to each question on a scale of 0 to 10. The mean for the superordinate questions was 4.23 on our scale of 10, the mean for the subordinate questions was 4.23, and the mean for the specific questions was 4.29. We are tempted to say that these findings are "significantly similar." The significance of this finding lies in the difference between what this assessment suggests about what the readers comprehended and what was revealed in the free retellings. The results of the free retellings seem to contradict findings by othe researchers (e.g., Meyers, 1978) that indicate that readers reveal better understandings of major concepts than less important concepts. Rather than accept either finding, we suggest that no single assessment procedure should be deemed to be so thorough as to be capable of tapping more than a portion of what readers understand. This is clearly an issue that demands further investigation and is one we will address further when we complete the analysis of all the events examined in this project.

The mean scores of these questions, while interesting themselves, do not clarify the variance among the quality of the responses for these readers. To assist our understanding the variance, we classified the responses into four categories, adequate (8-10 points), barely adequate (4-7 points), inadequate (1-3), and no response (0). The variance across each of the conceptual levels is revealed in the following table:

	Adequate	Barely Adequate	Inadequate	No Response
Superordinate	43	30	24	47
Subordinate	44	27	28	45
Specific	45	31	25	44

The variance among these readers is apparent in that at all three conceptual levels, students fared the same, although individual students did not demonstrate consistency with all questions; some students did better on some questions than others while only a few students represented the high and low ends of the scale for their individual total scores.

The cued-response questions that were used to analyze readers' comprehension across various conceptual levels were also designed to allow a second form of comprehension analysis. This dual classification system of cued-response questions (Vaughan, 1981) has been reported in an earlier issue of this monograph series. The three categories originally proposed have been refined to answer the following three questions about readers' comprehension:

1. What do readers know about what the text assumes that they know?
2. What do readers remember of what the text tells?
3. What can the readers figure out given their prior knowledge and what the text tells?

In more technical terminology, these questions might be called prior knowledge of key background concepts, factual or explicit comprehension, and inferential comprehension. When the questions are categorized according to this second classification scheme, they are grouped as follows:

Prior knowledge of key background concepts:

1. What is meant by topography?
2. What are continents?
3. Explain what scientists mean by "crust".
4. What is sediment?
5. Describe what is meant by "erosion".
6. In terms of topography, what does "summit" mean?

Explicit comprehension:

1. What are the major topographical features found under the oceans?
2. How does ocean topography differ from land topography?
3. How does the continental shelf differ from the continental slope?

4. What are ocean ridges, and what are rift valleys?
5. What two reasons are given that explain why the abyssal plains are larger in the Indian Ocean than the Pacific Ocean?
6. Describe seamounts.

Inferential comprehension:

1. Why are scientists interested in ocean topography?
2. What are the major differences in the topography of the Atlantic and Pacific Oceans?
3. The text says that the crust of the earth is much thinner under the oceans than under the land. How would a thin crust affect the topography of the ocean?
4. How could undersea avalanches cause the formation of submarine canyons?
5. Where ocean life is not abundant, the ocean floor is covered with red clay. What does red clay have to do with whether ocean life is abundant or not?
6. If rift valleys do indeed mark the center of areas where new crust is formed, how would this new formation occur?

Using the same ratings for students' responses to the questions as were analyzed across conceptual levels, we determined the means for the second classification scheme to be 5.83 for the prior knowledge questions, 4.13 for the explicit comprehension questions, and 2.79 for the inferential questions. What this reveals about the readers' comprehension of this selection seems quite important.

The intent of the prior knowledge questions was to determine whether the authors of the text were accurate in their assumptions about what readers knew about certain background concepts. The concepts we chose to evaluate were those presumably introduced to students earlier in the course or were assumed to be known from general experiences. On certain of these questions, (e.g., what are continents? what is a summit? what is meant by crust) a large number of students fared well while a few provided inadequate or no responses. On two rather critical questions (what is topography, what is sediment) students fared less well. Only twelve of the students provided adequate or barely adequate responses to the question on topography while nine students failed to respond to that item. This is disturbing in that the text never explains topography in this passage and it seems that the assumption is made that the students would remember what topography is from their study some 150 pages earlier. Apparently they didn't.

The explicit questions were designed to determine what the students were able to remember of what the text actually stated. The mean score for these questions indicates that students did not remember much of the explicit textual information. The means across the three conceptual levels for the explicit concepts were almost identical (superordinate, 4.05; subordinate, 4.27; specific, 4.07). The variance in their responses from adequate to no responses is interesting, especially when compared to the variance for the prior knowledge questions. This variance is indicated in the following table:

Variance Among Responses to Question Types

	Adequate	Barely Adequate	Inadequate	No Response
Prior Knowledge	80	13	16	35
Explicit	34	40	30	40
Inferential	18	35	31	60

Notice the significant decrease in the number of adequate responses across the categories, particularly from prior knowledge to explicit. If we tally the adequate and barely adequate responses for the first two categories, we find more comparability, but in general the quality of the responses tends to slide downward across all three categories.

The mean for the inferential questions was 2.79. This would suggest that these readers cannot infer well or perhaps lack some abilities in critical thinking. Notice particularly the significant increase in the number of no responses to the inferential questions. One explanation might be that the students do not understand how to even make an effort to answer a question for which the information is not explicitly stated in the text or for which they did not have prior knowledge. Another explanation might be that they did not understand the questions (i.e., that the questions were poorly phrased). Another explanation might be that the students did not possess the information necessary on which to make an inference. In some cases that seems likely, in that the nature of the information (see list above) would not lead us to think that the questions were particularly difficult, although several of them could be written more clearly. If that were the case, one would expect the mean scores for the individual questions to vary somewhat. That, however, was not the case. The range of means for the inferential questions was 2.25 to 3.33. Something is happening consistently across these items. We tend to believe that the difficulty that students are having is directly related to the text; the text is cueing thinking among these readers and the thinking is incomplete and convoluted because the text is far more inconsiderate than we thought when we examined it originally. Let's explore that a bit further.

The authors of the text assume that readers know the concepts of topography, continents, crust, sediment, erosion, and summit. That seems to be an invalid assumption, and it is most inconsiderate that the major concept, topography, is not explained in this selection. That might well explain why so few readers of this text included discussion of the superordinate concepts in their retellings. The comparison of the features of the ocean topography to those of the continents merely alludes to the concept of topography and few students seemed to pick up on the reference. The assumption about erosion, crust, and sediments were also not valid for many of these readers, and yet if students don't understand the relationship between thin crust on the ocean floor and the features of the ocean topography, they are not likely to understand why certain features of the ocean topography are present.

This failure of the authors to accurately predict what the students bring to the selection would clearly affect what they might understand and remember of what the text says. Too, let us not forget the inconsiderate structural elements of the text that distract the reader and the excessive inclusion of concepts (details) that are not essential to an understanding of the major topic or the major subtopics. With over 53% of the conceptual statements in this text being comprised of non-essential, specific details, what does the text suggest is important and should be remembered? The answer is identical with what students tell us that they read to remember: definitions and details because that's what teachers test.

What, then, about the readers' inferencing? The questions we chose to ask are things that we as educators thought were interesting, questions that we would want to explore with the students as a result of their having understood something about the topography of the oceans. The difficulty students seem to have with these questions is, we suspect, directly related to their lack of understanding about key background concepts _and_ major topics about the topography that are not well developed in the text. We are most reluctant to believe that these students cannot think analytically or that they cannot critically consider interesting questions about these concepts. We know adolescents too well: we observe them thinking analytically, making judgments and critically considering interesting questions all day long, especially outside academic contexts. Why, then, do they seem to have trouble with these questions? In this particular example, we lean toward placing the source of the problem with the text and to a lesser degree with the teacher who did not seem to recognize that the students lacked important prior knowledge or that the text could not cue the kind of thinking one would hope that it might.

The conclusions that we have drawn from this event are tentative and we do not intend to suggest that generalizations from this one examination can or should be made. Hopefully, we will understand more when the other events are analyzed and this event is contextualized with all the others we have examined. We do, however, believe it is reasonable to conclude that these students had considerable difficulty remembering what they read in this text and that what they did remember made little sense to them in the overall context of what topographical features are to be found under the oceans. We further find it unfortunate that this text chose to focus so much of its attention on non-essential concepts instead of helping students understand more about some interesting ideas such as why scientists are interested in the topography of the oceans, how a thin crust would affect the topography of the oceans, why the presence of rivers affects the size of the abyssal plains, why new crust seems to form in rift valleys, how undersea avalanches occur and how they cause submarine canyons, and what the presence of red clay has to do with the presence or absence of ocean life. We are not suggesting that the text refocus its conceptual attention; all of these topics we have suggested as being interesting have been raised in the text, only without any elaboration. Finally, we are convinced that students and teachers alike need to recognize the kind of thinking that is being stimulated by texts such as this one. If it is our object in education to help students become better thinkers and better consumers of knowledge, we need to help the students recognize that many of the problems they encounter as they try to learn about and think about concepts in science (as well as other academic areas) are attributable to inconsiderate texts. We believe that these students have the potential to understand all that they want to learn about the topography of oceans; all they need is considerate text and informed, considerate teachers.

Let us conclude by sharing one final bit of data we collected from the students during this event. It is related to our comment about helping students realize that they can learn even when they are having difficulty. Smith (1981) has noted that learning is significantly influenced by what he calls "sensitivity," and he defines sensitivity as "...the absence of any expectation that learning will not take place or that it will be difficult" (p. 111). The point is that students need to believe that they can learn, not believe that they cannot learn. By the time students have reached secondary schools, if not well before then, they seem to believe that not only will learning be difficult but that the cause of the difficulty lies within them as opposed to other sources. To explore this issue, we posed several questions to these eighth graders after they had read the text and responded to the comprehension assessment procedure used in their classroom. The questions we posed were these:

1. Do you actually read the text when assigned to?
2. Do you understand the material when you read it?
3. Do you think this text is easy or difficult?

The results of this informal survey were most interesting. The students were split fairly evenly between those who do and those who do not read the text. Some of them responded with comments like, "It's no fun to read, it's too confusing" or "When I read I don't understand a darn thing because it's so stupid." In answering whether or not they understand the material, again there was an even split between those who say they do and those who say they don't. It was the last question that generated the most interesting response. Even though a great many of these readers had experienced difficulty in their retellings or question answering, they responded 2 to 1 that the text is easy. And those who said the book was difficult were usually the students who had done best on the comprehension assessments. The issue is this: why would a reader who comprehended little of the material say that the book is easy? Perhaps these students have come to believe that any problems they encounter in reading must be their fault, nct the fault of inconsiderate text. It took the following statement from one of the more accomplished readers to remind us of where the difficulty lay: "It's (the text) hard because it doesn't get straight to the point. It goes on and on about facts, numbers and places that really don't matter at all." We couldn't have said it better ourselves. Isn't it time we began to let the students know that we know as well as they that the texts they are reading "go on and on about facts, numbers, and places that really don't matter at all" and that these texts are "hard because (they don't) get straight to the point"? Maybe then students will be better able to learn and to believe in the power of their learning.

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Retrospective Miscue Analysis: Procedures for Research and Instruction

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Introduction

As part of a three week workshop on miscue analysis offered by Dr. Yetta M. Goodman at the University of Arizona in the summer of 1982, Dr. Goodman and a team of doctoral students, John Woodley, Lynne Miller, David Weatherill, and Pat Long, explored the development of a set of procedures to be known as "Retrospective Miscue Analysis" (RMA). The team based its exploration primarily on the work done in Canada by Chris Worsnop (n.d.). Worsnop was interested in using the Reading Miscue Inventory (Goodman and Burke, 1972) as a tool for individual and group instruction with adolescents and young adults with severe difficulties in reading. The team set out with four basic objectives:

1. to review Worsnop's studies;
2. to gain first hand insights to his procedures by trying them on a few selected readers;
3. to delineate a set of procedures for Retrospective Miscue Analysis; and
4. to identify issues and areas of interest related to RMA for future investigation and work.

The following report summarizes the results of the summer investigation, and it describes the subsequent efforts to employ RMA procedures as an instructional approach in one reading lab. This information is advanced so that interested individuals may investigate the usefulness of RMA in their own instructional settings.

Worsnop's Investigations

Worsnop was concerned about those secondary school age students experiencing repeated failures in reading who seemed to be highly aware of their inability to read yet who wanted to improve their reading abilities.

Worsnop viewed the Reading Miscue Inventory (RMI) as an instructional tool that could potentially help students to realize many of the things that were going on while they were reading. The students would be helped to see their strengths as readers, and they would gain insights into the use of various reading strategies and cueing systems.

During a three year period, 1975 through 1977, Worsnop conducted four informal investigations into the use of the RMI as an instructional tool. In each investigation Worsnop followed standard RMI procedures through the retelling step. He then rewound the tape, and together he and his subject(s) listened to the reading, stopping the tape whenever a miscue was perceived. The miscue was identified and marked on a script of the story. Worsnop then presented certain questions to the subjects to guide them through an analysis of the miscue. The questions were derived from the Goodman concept of cueing systems and were presented to the subjects in a planned order. The following set of questions was developed through trial and revision during Worsnop's four investigations:

1. Does what the reader said mean the same as what is in the text?
2. Does what the reader said still sound like language?
3. Does what the reader said look like what is in the text?
4. Does what the reader said sound like what is in the text?
5. Did the reader self-correct? Why or why not?

Through the questioning procedure, Worsnop focused the reader's attention on the semantic, syntactic, visual, and/or phonetic consistency of each miscue. While Worsnop presented the questions in order, he stopped the questioning as soon as he got a "yes" answer. Worsnop intended this to impress the reader with the idea that semantic consistency, meaning, is the most important consideration in reading. During the analysis of a miscue, Worsnop continuously encouraged and praised the reader for risk taking, good tries, and use of various cueing systems.

One of Worsnop's hopes was that pairs or small groups of students would be able to use and learn from the RMI and questioning procedures without the direct aid of a teacher. He attempted to put this idea into practice; however, in each of the four investigations there was heavy teacher and/or researcher involvement. Worsnop explained that teaching the RMI/ Questioning procedures to the readers necessitated direct instruction during the introductory sessions.

Although his findings were tentative at best, Worsnop remained enthusiastic about using the RMI for instruction. In his opinion the subjects made some gains in their ability to read, with more obvious gains in the improvement of their self-image as readers. Furthermore, Worsnop believed that those few teachers who participated with him in his investigations came to see the RMI as a potentially useful instructional tool.

Summer Workshop, 1982

As part of our work, we were interested in 1) gaining first hand insights to Worsnop's procedures by trying them on a few readers, 2) delineating a set of RMA procedures, and 3) identifying areas related to RMA for future investigation and work. Regarding our first objective, we had three exploratory sessions with two readers. Each session lasted approximately an hour and a half. Prior to each session we chose certain aspects of the developing RMA procedures upon which to focus our attention.

In the first session we met with one reader, Lucas, age 10. We were particularly interested in observing Worsnop's RMI/Questioning procedures in action. As a result of the session, four basic issues were raised:

1. What series of questions is most appropriate to guide a reader through an analysis of the miscues?
2. For which readers would RMA be beneficial?
3. What steps should be followed in replaying the tape of the story read and identifying miscues?

4. What amount and type of instruction should be given to readers participating in RMA? (i.e., Should readers be given instruction and practice in identifying miscues prior to analyzing their own miscues?)

In the second session our reader was David, age 10, and we focused our attention primarily on the series of questions to be asked during RMA procedures. After the session we came to the conclusion that a teacher may want to use a specific, purposefully leading set of questions for instruction whereas a researcher trying to get at the reading process may use a very different line of questioning -- more open ended in design. Again, more issues were raised than were settled.

For our third session with readers we brought Lucas and David together in order to observe them as a pair working through RMA with one of our team members. Each child had a script of the same story. Lucas read the story aloud while David followed along reading silently. Lucas did the retelling as per standard RMI procedures, but David was asked to volunteer any additional information. During the analysis of the miscues, either child could stop the tape recorder, and both readers were involved in answering the questions about the miscues. We were focusing in this session on the questioning procedures, the mechanics of using the tape recorders during the analysis of miscues (see chart p.58), and the participation procedures of two readers as opposed to one.

It needs to be emphasized that these three sessions were exploratory in nature. Our principle aim in working with the two readers was to help us to raise questions helpful in developing RMA procedures. We found observation of their interaction with possible RMA procedures invaluable. Below we share with you the major questions raised. Each of them points to a topic for further investigation:

1. What application do RMA procedures have to instruction? to research?
2. With whom, with what types of readers, are RMA procedures useful?
3. Can RMA be effective without the direct participation of an instructor?
4. What questions related to analysis of miscues should be asked?
   a) Should there be a set series of questions?
   b) Should the questions be leading or open ended?
   c) What does one want the reader to gain through the questioning?
5. What level of reading difficulty of RMI story is best for use within RMA procedures?
6. Is there an optimal time lag between the oral reading and retelling in the RMA and the subsequent analysis of miscues?
7. Should all miscues be analyzed by the reader? If not, which ones should be?

RMA Procedures

Through discussions during the summer workshop of the questions presented in the previous section, we were able to delineate some basic RMA procedures. Further refinement of the procedures will develop as they are used.

Whether for research or instruction several important procedural decisions will have to be made by each researcher or teacher depending on the specific circumstances surrounding the use of RMA. Hopefully the decisions will be based on experience as a teacher and/or researcher, full knowledge of the procedures and philosophy underlying the *Reading Miscue Inventory*, and sensitivity to readers' needs and vulnerabilities. This decision making aspect of RMA on the part of the teacher and/or researcher is a fundamental part of the overall procedures. The individual using RMA will be in the best position to adapt it to the situation at hand and to the needs of various readers.

In order to distinguish RMA procedures for research from those for instructional purposes, RMA-R, R representing "Research", and RMA-I, I representing "Instruction", will be used from now on when it is deemed necessary to differentiate between the sets of procedures. The major procedural difference between RMA-R and RMA-I has to do with the questioning procedures used when analyzing the miscues with the reader. During RMA-R the researcher, in attempting to gain insights into the reading process, would probably structure very open ended questions. On the other hand, an educator, interested in helping a reader to revalue his/her use of reading strategies (Goodman and Burke, 1980), would probably ask a specific set of leading questions. The following chart maps out both RMA-R and RMA-I procedures.

RMA-R (Research)	RMA-I (Instruction)
Purpose:	Purpose:
1) For researcher to gain insights into the reading process	1) Help readers become aware that they use strategies and cueing systems while reading 2) Help readers revalue themselves as readers, seeing own strengths 3) Help readers build a meaning-focus model of the reading process
Equipment & Materials:	Equipment & Materials:
1) a. Tape recorder #1: to record reading and retelling using RMI procedures b. Tape recorder #2: to be left running throughout analysis of miscues with reader	1) Tape recorder #1: to record RMI story and retelling
2) Scripts of story for RMI	2) Scripts of story for RMI
3) Pencils for marking scripts	3) Pencils for marking scripts
Subject(s)/Reader(s):	Reader(s):
1) Number and type dictated by research question	1) Grouping options a. teacher + one reader b. teacher + two or more readers c. two or more readers without teacher 2) Good readers who need to confirm their strengths as readers 3) Those at risk who need to revalue themselves as readers

Procedures:

1) Administer RMI procedures including reading and retelling
2) a. Rewind RMI tape
   b. Then start tape recorder #2
3) Play RMI tape, stopping tape upon perceiving a miscue*
4) Identify miscue and mark it on script of story
5) Question reader for analysis of miscue**

Researcher's decisions:

1) Selection of appropriate RMI story for RMA-R
2) Time frame for completing RMA procedures with reader(s)
3) Amount of instruction given to readers about RMA-R prior to and during using of RMA-R

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*Research question will dictate:
  1) who stops tape: reader, researcher; reader or researcher
  2) which miscues will be analyzed
**Research question will dictate:
  1) nature of questions or inquiry
  2) order of questions
  3) number of questions

Procedures:

1) Administer RMI procedures including reading and retelling
2) Rewind RMI tape
3) Play RMI tape, stopping tape upon perceiving a miscue+
4) Identify miscue and mark it on script of story
5) Question reader for analysis of miscue++

Teacher's decisions:

1) Selection of RMI story for RMA-I+++
2) Time frame for completing RMA-I with reader(s)
3) What teacher wants reader(s) to gain through discussion of miscues
4) Teaching readers to carry out RMA-I procedures in pairs or small groups with supervision but not direct participation by teacher

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+Teacher's purpose determines who stops tape: reader(s) and/or teacher.
++Leading questions directed at reader(s) with the aim of fulfilling purposes of RMA-I. Reading instruction is being carried on through discussion of miscues.
+++Difficulty of RMI story will affect types and numbers of miscues made. Reader may be made aware of this by interacting with various materials in RMA-I procedures.

A Cautionary Note

Using RMA-I procedures, the teacher is supporting readers through an evaluation of their own reading with the purpose of facilitating reading development. Readers are being helped to identify their strengths as readers as well as being helped to specify problems and gauge their relative significance within a meaning-focus model of the reading process. Readers may gain insights to the degree to which they make use of and integrate the available language cueing systems and reading strategies. RMA-I procedures are aimed at focusing readers on their overall involvement in the reading process, not on isolated "errors".

RMA-I procedures may be misused if the teacher does not understand the basic premises mentioned above and proceeds to use the procedures for "error analysis" with the reader. For those not familiar with the Goodman Model of Reading and miscue analysis, it is strongly recommended that these areas be studied and thoroughly understood before using RMA-I with students. The bibliography contains references which will be helpful.

RMA-I Applied to an Instructional Setting

In an attempt to extend the investigation from the summer workshop into a classroom setting, the RMA-I was used in one Southern Arizona high school reading lab during the 1982-83 academic year. The teacher used RMA-I procedures to help readers in the lab who had difficulty with reading come to value themselves as competent readers and users of language. Goodman and Goodman (1981) have explained the importance of students who are at risk as readers coming to value, or revalue, their own competence in reading.

The reading lab involved four forty-five minute classes each school day with enrollment ranging from ten to fifteen different students per period. Because RMA-I is a rather lengthy procedure, requiring up to two hours of involvement for each passage, three to four consecutive days of class were assigned to the use of RMA-I. For the sake of maintaining continuity for students, RMA-I was scheduled in such a way that neither weekends nor holidays interrupted work with one passage. One of the concerns of the summer investigation team, that of the time lag between the reading of the passage and the subsequent analysis and discussion of miscues, became subject to the realities of the schedule of a public high school which dictates the length of instructional periods. Other teachers attempting to use RMA-I in a classroom setting will find similar restrictions which may affect the procedures used.

In order to familiarize the students with RMA-I procedures and to help them feel comfortable discussing miscues, RMA-I was introduced in all four classes over a three week period. During this period, the teacher was actively involved in establishing procedures and in modeling supportive behavior for all students. The teacher used information collected during these three weeks to decide on the advisability of using RMA-I with each of the four classes beyond the introductory period.

Each week one student volunteered to read a passage aloud to be tape recorded and then used for analysis in the four classes. The reader remained anonymous unless s/he chose to reveal his/her identity. In this way the volunteers were less likely to be threatened or uncomfortable about class discussion of their miscues.

The recording sessions were done in private. Each volunteer read one passage of 3000 to 5000 words aloud into a cassette tape recorder and was given no assistance by the teacher while reading. When the reading was complete, the volunteer gave an oral retelling of what s/he remembered from the passage. The cassette tape recording which was made of the reading and retelling was then ready to be played back, analyzed, and discussed in each of the four classes.

Copies of the passage were given to each member of each class before the playback so that the students could follow the script as the tape was played. The students first heard the tape from beginning to end (following along on their copy of the passage) in order to gain a sense of the story before discussing miscues. This was also done to allow class members the opportunity to identify miscues made by the volunteer reader on their own.

After the passage had been played through once without interruption, it was played a second time. This time members of the class were instructed to raise a hand anytime a miscue was heard. At this point, the teacher would stop the tape, rewind it past the point of the miscue, and replay it until all could agree on the miscue which had been made. When a concurrence had been reached, discussion of the miscue took place. The teacher used the following questions to guide discussion:

1. Does it (the miscue) make sense?
2. Does it fit the passage?
3. Does it sound like language?

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4. Does it look like what is on the page?
5. Does it sound like what is on the page?

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6. Did the reader correct it?
7. Should the reader have corrected it?

The first three questions were always asked about each miscue. This was done to help the students realize that if something makes sense, it must also sound like language. Only if the class gave "no" answers to all three questions in this first group would the fourth and fifth questions be asked. In this way the importance was placed on the sense of language and making sense of what was read rather than on looking at the "right letters" or making the "right sounds". The last two questions were always asked regardless of which questions had been asked previously. This was done to help the students understand that not all miscues are of the same quality nor should they all be treated in the same way -- those miscues that seriously alter meaning or the pattern of language may need to be corrected, others may not. At first the students indicated that all miscues should be corrected. Slowly they seemed to develop an awareness that if indeed the miscue made sense, fit the passage, and sounded like language, then it may have been inefficient for the reader to have corrected it.

It should be pointed out that during the three week introductory period the teacher played an active role in the procedures: identifying miscues, participating in discussions, and offering encouraging remarks about the volunteer readers and the students who were discussing the tapes. It was seen as being of utmost importance to keep the atmosphere comfortable and as non-threatening as possible in order to encourage students to discuss the miscues freely and to take the risk of being a volunteer reader later on.

When each class had completed three weeks of initial experiences with RMA-I, the teacher evaluated the development of each class to determine whether further work with the procedures would be beneficial to the students. To make these determinations, the following guidelines were used:

1. The degree to which the class worked together without becoming unduly critical of one another or the reader.
2. The degree to which the class was willing to identify and discuss miscues they heard on the tapes.
3. The degree to which the class seemed to enjoy and benefit from RMA-I.
4. The degree to which the class seemed to understand why RMA-I was being used and was willing to reconsider their previously held notions of reading.

As a result of this evaluation, two of the classes continued work with RMA-I while two of them discontinued use of the procedures.

The two classes which continued with RMA-I were further broken into subgroups of four to five students per group. Once again the limitations imposed by life in a public high school played a part here. The teacher actually intended to form groups of two or three students, figuring groups that size would maximize involvement for each student; however, only three working cassette recorders could be found for use at any one time, thus determining the size of the groups.

In each of these groups, situated around the room so all could work simultaneously, one person was chosen to be the reader, and one was chosen to operate the tape recorder. All group members were given copies of the passage so that as the reader read orally into the tape recorder, the other students could read along to themselves. Once the reading was completed, the tape was rewound and played back following procedures established during the three week introductory period. Once a miscue was identified, the discussion was guided by the same set of questions cited earlier; however, students in each group handled the discussion on their own, without direct teacher involvement. During these sessions, the teacher's job was to monitor the groups and to help keep things moving smoothly.

RMA-I procedures are quite involved and require a large commitment of both time and energy on the part of teacher and students if they are to be used in the classroom. The results of using RMA-I as an instructional strategy are inconclusive, but the teacher in this reading lab believes the following benefits accrued:

1. The students were less critical, more accepting, of the reading behavior of themselves and of others.
2. The students seemed more comfortable when talking about their own reading with others, including the teacher.
3. Because the teacher had heard extensive oral reading by many of the students, instructional responses to the reading were made.

Concluding Remarks

Investigations during the summer of 1982 and during the 1982-83 academic year into Retrospective Miscue Analysis have yielded procedures which seem to have potential applications for both instruction and research. The information presented here about RMA is offered in the vein of state-of-the-art with full awareness that our explorations have raised more questions than answered them. It is hoped that others will see the possible applications of RMA-R or RMA-I procedures to their own research or instructional needs and adapt the procedures accordingly. For those interested in pursuing use of RMA-R procedures, several related works have been cited in an addendum to this report. Also included in the addendum are citings of three pieces of work for those who are interested in RMA-I procedures. RMA procedures, whether for instruction or research, seem to be worthy of further investigation. and through the combined efforts of individuals working to refine RMA in various settings practical and significant use may be made of the procedures.

We welcome comments and reactions regarding the procedures presented in this report. Please address them to:

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Addendum

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Redefining Readability:
A New Look at an Old Concept

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There are at least two reasons why secondary teachers, particularly those who specialize in the reading and writing areas, should be interested in redefining the concept of readability. First, although nearly all reading teachers at all levels have begun to question the formula concept of readability, the limited validity of the formulas is most apparent with secondary level materials. Second, at higher grade levels it is important that any meaningful measurement of readability allow for factors peculiar to the various content areas, a requirement which the formulas cannot fulfill.

Reasons for redefining readability

Although readability formulas genuinely can be helpful in classifying materials into levels of difficulty, their overall usefulness is severely limited. They can be used as a starting point but hardly a deciding factor in matching students with appropriate materials. Davison and Kantor summarize the limitations well:

> Readability formulas, in our opinion, fail to give any adequate characterization of readability, except in a purely statistical sense from which no particular valid conclusions can be drawn for creating readable texts. We believe that the specific examples we discuss here make a strong case against using readability formulas as guides to writing. We urge writers to rely on their own judgments about language which is appropriate for the intended reader, and not on stereotyped notions, or readability formulas. (Davison and Kantor, pp. 207-208)

These limitations are particularly apparent at the secondary level.

One obvious reason is that the formulas generally lose validity at the higher grade levels. When one is teaching technical material with specialized words and assumptions, material with a definite point of view and/or bias, or material which is open-ended and is designated to provoke discussion, then judging that material by the mere consideration of its vocabulary and sentence complexity is both inaccurate and superficial. The student's interest in the material, his ability to deal with the style and organization of the writer, his understanding of the multiple meanings of familiar as well as unfamiliar words and ideas, and particularly his ability to use context as a means of predicting and confirming information--none of these crucial factors are measured by readability formulas.

Readability, as measured by the cloze procedure, does enlarge the concept to include the student's ability to use language and context by measuring the student's ability to predict what the writer has written. If the material is predictable to the reader, then it will be comprehensible, but this does not insure that the material will be interesting enough to retain the reader's attention and thus be fully readable.

The factor of reader interest, and specifically the ability of the writer to draw and hold the reader's attention on the material, is neglected in both the formula and the CLOZE concepts of readability. However, this attention-holding factor is crucial, particulary at the secondary level, where students are less of a "captive audience" and have begun to develop their own areas of special interest.

A second reason why secondary reading teachers and specialists should be interested in broadening and redefining readability is that readability, as measured at higher grade levels, must be able to account for factors specific to various content areas. Within the various content areas, reading materials have specialized vocabulary, prerequisite skills, preferred methods, accepted principles and operating assumptions, etc. Any useful and meaningful method of measuring readability of materials in any particular content area must consider the specialized context of that area of study. The concept of readability must be broad enough to account for the factors of specialization in each area and yet specific enough to be helpful in the decision-making process of properly matching students and materials.

Readability as a rhetorical concept

In formulating a useful concept of readability, reading specialists might begin by exchanging roles with writing specialists and looking at the reading process from the writer's point of view. Trimble's description of readable writing is typical of the opinion of most writers: "Readable writing is writing which invites reading" (Trimble, 1975). Although the definition is not helpful in terms of specifics, it confirms the limitations of formulas and procedures for defining readability. Trimble focuses on the factor of interest in writing, as would most writers. He implies that writing should not be considered fully readable simply because it is fully comprehensible. Readable writing also must be capable of holding the reader's attention, preferably inviting his pleasurable interest and concentration.

This concept of readable writing is clearly related to but far from synonymous with the concept used by most reading teachers. The area of overlap between the two perspectives on the concept might be considered the area of successful communication. To whatever extent the writer invites and holds the attention of and presents material comprehensible to the reader, and to whatever extent the reader attends to and comprehends the writer's meaning, that is the extent of the readability of the material. The readability of the material is a measure of the successful communication between writer and reader.

If the writer does intend to maximize the communicability of his writing, then he will work consciously to hold the attention and facilitate the comprehension of his reader. Throughout the writing process, from planning to proofreading, he will make decisions, both consciously and subconsciously, which will affect his relationship with his future reader. The end result of all the writer's decisions is called his rhetorical stance.

A few of the many decisions that a writer must make are indicated in Table One. The large-scale decisions generally are made during the planning process. The small-scale decisions are primarily intra-sentence choices which an experienced writer will make subconsciously. The medium-scale decisions affect more than a single sentence and may affect the writing as a whole.

Although various factors may be considered as the writer makes these decisions, the factor of predictability is fundamental, serving as a broad principle for all the others. If the writer makes predictable choices, then the reader can process the material efficiently and comprehension should be increased. Further, if the writer successfully invites and maintains the reader's attention on the material, then processing should go smoothly and comprehension should increase. However, if the writer makes totally predictable choices and the material is so predictable to the reader that his attention and interest wane, then the reader becomes distracted and bored and comprehension is lost.

Table One

Examples of Factors Affecting Readability

I. Large-scale decisions
   - A. Occasion of writing
   - B. Point of view
   - C. Characters and plot
   - D. Format of presentation

II. Medium-scale decisions
   - A. Title
   - B. Introductory and closing paragraphs
   - C. Patterns of organizations
   - D. Transitions between paragraphs
   - E. Style

III. Small-scale decisions
   - A. Predictability of semantic/syntactic choices
   - B. Simplicity of integration for the reader
   - C. Connections between clauses
   - D. Amount of time and material before closure

(Expansion and adaptation of material presented in Hirsch, 1977)

Many examples of the predictability factor could be noted, examples from all levels of the writing process. In choosing a title, a writer can choose to be either more or less predictable. When the reader sees the title "An Argument Against Capital Punishment," he has a headstart toward comprehension of the passage. In contrast, a title such as "Suzanne" or "Black and Blue" gives little advanced meaning but can be important in creating interest. If the writer chooses to use an introductory paragrpah, a topic sentence at the start of each paragraph, and clear transitions between paragraphs, the clarity of the material should be enhanced. However, any of these devices, if overused and/or used mechanically, can "turn off" the reader and fail to invite reading.

Within the sentence, the writer gains clarity by making predictable semantic and syntactic choices. The reader can process the material more efficiently if he can predict and confirm meaning readily. Nevertheless, an ambiguous or unconventional word or phrase can be used effectively to "wake up" the reader and renew his attention. This phenomena is evident in the contrast between the following two sentences: Drinking water can be dangerous (which is ambiguous and a source of confusion) as contrasted with Now and in the hereafter government spending must be closely monitored (in which the double meaning of hereafter makes a point and therefore is used effectively).

The writer constantly makes decisions. If his decisions are wise and made in accordance with his audience, then the product should be successful communication, readable writing. However, readability defined in this way, as the end result of the writer's rhetorical stance, is vague in terms of application. It does not produce a formula or a procedure, but it establishes working assumptions which can lead to guidelines. The most significant assumptions would seem to be the following.

Working assumptions

1. Readability is neither intrinsic (an attribute of particular pieces of writing and not of others) nor subjective (totally dependent on the reaction of the reader). It is a measure of the level of communication between projected author and reader (as he reads) or between projected

audience and writer (as he writes). Given a certain hypothetical (or established) audience, a writer can increase readability in various ways. The reader also can increase readability in certain ways, including understanding the author, his purpose in writing, and his point of view.

2. Readability is enhanced as predictability is increased but diminished if attention is not maintained. For the explanation of a complex scientific theory to be highly meaningful to the average reader, the theory must be explained in familiar terms and with familiar analogies. In contrast, "The Three Bears" is highly readable for adults only if the repetitious story is interlaced with touches of the unexpected. The highly familiar must be given some new "twist" to avoid monotony and boredom.

3. Any particular reader will find some writing more readable than other writing, even if both pieces of writing are on the same level as measured by a formula or procedure. For a mature reader, the degree of readability will depend more on the factors of interest level and prerequisite knowledge than on the "reading level" of the material. For example, a lawyer, scientist, or doctor would find materials in his area of specialization to be readable but might have considerable difficulty with literature from another specialized field. This same situation can exist with a student who particularly enjoys one area, such as math, but has little interest in another, such as literature.

4. The readability of difficult material can be enhanced for any particular reader if the difficulties in that material can be minimized or overcome. After the reader understands the specialized used of technical vocabulary, the particular assumptions and/or point of view of the author, etc., then difficult material can become quite readable.

Role of reading specialists

As reading specialists, there is little that we can do directly to affect readability from the writer's perspective. This job must be left to writing specialists or handled jointly through classes such as content writing. There are, however, many things that we can do to affect readability from the reader's perspective--things which affect readability in all content areas. We can set the stage for the reader by building his background and interest in the material. We can make the material more "processable" by teaching unknown concepts and words used in specialized ways. We can help the reader learn to read actively, purposefully--asking questions, predicting, confirming, drawing implications, making judgments, and using the material for creative endeavors. Furthermore, we can continue to study the concept of readability ourselves, by working on questions such as the following:

1. If a reader finds material meaningful and interesting but the meaning is not that intended by the author (as happens with interpretations of poetry and even of argumentative/editorial types of writing), can that material be considered fully readable?

2. Are there certain minimal requirements (perhaps of language usage and writing conventions) which all writing must fulfill before the factors of comprehensibility and reader interest can even be considered?

3. Is it possible to specify the factors which most affect reading within the context of a specialized area, whether law, medicine, trigonometry, or secondary health?

4. Is the student's ability or inability to fully comprehend and appreciate reading materials a matter of sincere interest and concern to most content area teachers? Are we, as reading specialists, knowledgeable enough to lead and guide the efforts of the concerned content specialists?

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A Study of Reading Deficiencies and Previous English Instruction of Land Grant University Students at the Entry Level

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Introduction

Students are entering post secondary institutions with reading skill deficits which may hinder their ability to succeed in higher education. Many of these students cannot pick out the main ideas of chapters or passages. They have trouble deciding what is important for them to know or remember and what is not. These students rely on their instructors to tell them exactly what they are to "get out" of the reading assignment. A number of students also have difficulty applying and interpreting what they read. They do not have the critical reading and thinking skills necessary to make judgments about their reading materials. What is written is taken at face value no matter if it is fact or opinion. Synthesizing information obtained from several sources becomes a difficult, if not impossible, task for many students.

Another area that is in critical need of attention is the rate of reading and flexibility. Many freshmen enter the university reading so slowly that they cannot possibly keep up with required reading assignments. Harris and Sipay (1975) estimate that 250 words per minute is a reasonable reading rate for high school students and adults in materials of average difficulty and, while this may be adequate for many adults, it is not for the student who must read many volumes in a single semester, such as an animal science or biological science major at a land grant university. Furthermore, a number of students enter the university reading only 95 to 150 words per minute. Even if all textbooks were written at a level of "average difficulty," the slower reading student is at a definite disadvantage.

Along with rate goes flexibility. Many students approach all reading assignments the same way. They tackle Chapter III of their chemistry text the same way they tackle Chapter III of an adolescent novel. Students need to be able to adjust their reading rates to the material to be read. Style of writing, author's purpose for writing, reader's purpose, print size, and chapter length are only a few of the factors that readers need to take into consideration before they read in order to read efficiently. Those students who are entering land grant institutions especially need to have the ability to read critically with efficiency and flexibility. Land grant colleges and universities tend to require more technical and difficult reading than liberal arts colleges due to their science and technical orientation. Students at land grant institutions will find themselves reading widely varied types of textbooks and written materials. Well developed reading skills are critical for success for these students.

Clearly, more effective methods of teaching reading at both the secondary and post secondary levels needs to be developed. Students must be provided with courses that will teach critical reading and thinking skills, develop flexibility, and improve reading rate. At present, many language arts curricula at the high school level do not provide for skill development necessary for successful completion of course work by freshmen at major land grant universities, such as Colorado State University. The majority of high schools tend to view reading courses as being only for remedial students--those who are having academic problems. Developmental reading courses, that is, courses that are geared to further develop the reading skills of average students, need to be included in the high school curriculum. It is essential that students who intend to enter colleges and universities have the reading skills they need to continue their education.

The purpose of this study was to examine the specific reading deficiencies of students entering Colorado State University who enroll in reading service courses as an elective.

The Education Department at Colorado State University offers two reading service courses--Reading and Study Skills and Speed Reading and Comprehension Skills. Both are elective, one-credit courses running seven weeks in length and open to all students enrolled at the University. While each course is concerned with the development of different reading skills, students would not necessarily need to take both courses, though they may choose to do so.

Reading and Study Skills focuses on time management, test taking skills, note taking, and outlining. Vocabulary development is also a major component of this course. Speed Reading and Comprehension Skills focuses on flexibility and reading rate with an emphasis on comprehension. Methods for reading more efficiently are stressed as well. Both courses utilize, to varying degrees, textbooks and required readings from students' other classes. An unpublished study by Dr. V. Pauline Hodges at Colorado State University in 1977 and replicated in 1980 indicated that, of the students then enrolled in reading service courses, 61 percent were having difficulty reading assigned materials for their courses at Colorado State University and that this difficulty was reflected in the grade point averages of those students. The study also showed that only five percent of the students enrolled in reading service classes came from high schools that offered some sort of reading program. Specific reading deficiencies of students in the study were noted to be reading rate and interpretive comprehension, along with technical vocabulary. Of the two service reading courses offered at the University, Speed Reading and Comprehension Skills addresses the needs of the majority of students since it deals directly with improvement in the areas that students are having the most difficulty with.

If rate improvement and comprehension skills classes (developmental reading classes) were required for students at the high school level, students would possess the reading skills necessary to be successful in college level course work or in voc-tech schools. High school administrators and faculty should work with university faculty in a cooperative effort to develop reading programs that would benefit both college bound and remedial students. Service programs currently offered at the university level could be used effectively to fit the goals and specifications of secondary schools needing developmental reading programs. This cooperation would be beneficial to both post secondary and secondary schools.

Until developmental reading courses are implemented at the high school level, the university must continue to offer reading service courses in order to assure students of acquiring needed reading skills. For those students who enrolled in Speed Reading and Comprehension Skills at Colorado State University, it was hypothesized that a significant improvement in rate and comprehension skills, as measured by an appropriate standardized reading test, could be noted at the end of the seven-week course. It is proposed that the same course could be offered in high school even more appropriately.

Subjects for the Study

The subjects for this study were the 353 students enrolled in ED 106, Speed Reading and Comprehension Skills, at Colorado State University classes during Fall and Spring semesters of the 1981-1982 school year. Students represented all colleges at the University. The majority of those who enrolled were freshmen. However, a number of sophomore and junior students were included, as well as a small number of senior and graduate students. Of seven weeks in length, Speed Reading and Comprehension Skills is an elective, one-credit course designed to increase reading rate and flexibility and develop comprehension skills.

Instruments

Comprehension and reading rate subtests of the Nelson-Denny Reading Test were chosen for use as pre and post-tests for this study. Alternate forms--form C as a pre-test and form D as a post-test--were administered at the beginning and end of each seven-week course. The vocabulary section of the test was not given. The Nelson-Denny was chosen for the following reasons:

1. The inclusion of a reading rate estimate
2. The level of difficulty
3. The wide norming sample

The Nelson-Denny Reading Test is designed to measure vocabulary skills, comprehension skills, and estimate reading rate of students from grades nine through sixteen. Split-half reliability is reported to be in the range of .78 to .85 for the comprehension subtest of both forms C and D, using the Pearson product-moment correlations formula and correcting with the Spearman-Brown formula. Alternate forms of reliability is reported in the range of .66 to .78.

Students who were enrolled in ED 106 classes during the first seven weeks of the Spring 1982 semester were also asked to respond to a questionnaire designed to find out information about the educational background of the student, including present college status, years since high school, grade point average in English in high school, rank in graduating class, size of graduating class, and the number of students in their high school.

The second section of the questionnaire was related to the student's high school program in English and reading and the reasons for enrolling in ED 106. Data on the types of English classes, whether these classes were elective or required, and the number and kinds of reading classes offered in their respective high schools was also obtained.

The data collected from this questionnaire was used in correlation studies with pre- and post-test data. Results of these correlations are found in Tables 1-4.

Another questionnaire was designed to be used in further investigation of the background of ten students selected randomly from the total population of those students enrolled in ED 106 classes. This follow-up questionnaire was used to establish not only the number of English and reading courses these students had taken in high school, but also the content of each course taken and whether the course was elective or required.

Case Studies of Randomly Selected Students

Using random number selection procedures, twenty students were chosen from the population of 353 students enrolled in ED 106 to be surveyed for further information. Because of time limitations and distances to travel for interviews, the number for case study was further reduced to the ten who were graduates of high schools located on the front range or eastern plains of Colorado. All students included in the study were contacted for permission before any information was obtained. Total anonymity was guaranteed to all participants. Information was obtained by personal and telephone interviews with each student's high school counselor and/or head of the English Department of the high school from which the student graduated. In two instances, the principals of the high schools were also included in the interview. In each interview, the same list of questions was used.

Statistical Procedures Used

Data analysis for this study was done using the Statistical Package for the Social Sciences (SPSS) system. Several statistical procedures were used:

1. A t-test was done to evaluate the student's progress in rate and comprehension in the Speed Reading and Comprehension Skills class.
2. A Pearson r procedure was used to determine correlation of background information of the student with pre- and post-test scores on the Nelson-Denny Reading Test.
3. A condescriptive procedure was used to calculate means for a better analysis of the academic and educational make-up of ED 106 students.
4. A frequency of pre- and post-test scores for reading rate (words per minute) was made.

Case Studies

The results of the ten case studies provided useful information on and insights about ED 106 students. Each interview's findings are described separately.

Student L is a sophomore math major with a grade point average (GPA) of 2.1. Student L graduate from high school in a small city in southern Colorado. The school's population is evenly divided between Mexican-American and Anglo students. Student L graduated in the top half of his class. While in high school, Student L took three years of required English, incuding grammar, American literature, and composition. He also elected to take a creative writing course and participated in a summer English seminar. Student L did not elect to take a reading course though one was offered at his high school at the time.

Student M is a sophomore business major with a GPA of 2.3. Student M graduated from a large high school in a prosperous suburb of Denver. The English program at this high school is traditional, with three full years of English required. Student M's required courses included grammar and composition. Even though Student M was receiving C's and D's, he elected to take both American literature and English literature in his senior year. He received a D in the first course and an F in the latter. No reading courses are offered at Student M's high school.

Student N is a freshman engineering major with A GPA of 3.0. Student N attended an all-male parochial high school in Denver. English is required for three of the four years at Student N's high school. Grammar and composition are required. In his senior year, Student N was included in an honors English program. His high school GPA was 3.4. No reading courses were offered at this high school.

Student P is a freshman business major with a GPA of 2.5. She graduated from a large high school in an affluent section of Denver. Her high school GPA was 2.9. Student P took required English grammar and composition classes in ninth and tenth grades. No other English courses were taken. No reading courses are offered at this high school.

Student Q is a junior agricultural business major with a GPA of 2.7. He graduated from a small consolidated high school in rural northeastern Colorado. Student Q took required English composition, grammar, and literature courses in ninth and tenth grades. He elected to take drama, American literature, and a short story class in eleventh and twelfth grades. His high school GPA was 3.0.

Student R is a freshman, major undecided, with a GPA of 2.5. He attended high school in a mountain community west of Denver. His high school GPA was 3.0. Student R was required to take three years of English, including literature, grammar, composition. Only remedial reading courses are offered at this high school.

Student S is a sophomore liberal arts major with a GPA of 2.1. He attended a large high school on an Air Force Base south of Denver. His GPA was 3.0. Student S took two years of required English, including basic writing and American literature. In his junior and senior years, he elected to take college preparatory composition and a mass media course. Remedial reading only is offered at this high school.

Student T is a freshman information systems major with a GPA of 2.9. He attened a large metropolitan high school in Denver. His high school GPA was 3.25. Student T took three years of honor level English, including creative writing. He did not take a basic grammar course. Remedial and Title I reading are offered at this high school.

Student V is a freshman history major with a GPA of 2.5. She attended a large high school in a city north of Denver. Student V took three years of required English, including basic writing and literature. She did not take a grammar class. No reading courses are offered at this high school.

Student W is a freshman biology major. No college GPA is given. He graduated from a large high school in a rapidly expanding suburb of Denver. Student W took four full years of English--two required, two elective. In his junior and senior years, he elected to take college preparatory grammar, a science fiction course and an expository writing course. No reading courses are offered at this high school.

All of the students, but one, read 800 words per minute with 80 percent comprehension on their final book examinations.

All of the schools contacted were in the process of restructuring their English programs or had restructured them within the last year. However, none of the schools offers a developmental reading class of any kind. The one school that did offer a developmental reading class has dropped it from the curriculum because of budget cutbacks.

Survey Data

It was assumed at the beginning of this study that students enrolling in ED 106 were C average students who had not taken many courses in English or reading in high school. In order to get a better understanding of the educational background of these students, a condescriptive analysis was done utilizing information gathered from a survey of students enrolled in ED 106. The results of the analysis did not support these assumptions. According to the findings, the mean high school English grade point average of these students was 3.51 and the mean number of years of English in high school was 3.17. The mean of the rank in high school graduating classes was 70.89. These students not only had high grade point averages in high school, they also graduated in the top half of their classes.

The assumption that few students had taken a reading class in high school proved to be true. Only 27.4% of the students had taken a reading course in high school. Of those who had taken a reading class, the majority indicated that the course was developmental (see Table 3). However, a majority of the students did take grammar and composition classes. Half of the students indicated that they were required to take English courses.

TABLE 1

CONDESCRIPTIVE ANALYSIS OF SURVEY DATA

N = 84

	Mean	Standard Deviation	Minimum	Maximum
Status in College*	2.00	1.14	1.00	4.00
Years since High School	2.89	2.29	1.00	9.00
GPA - High School English	3.51	.611	1.00	4.00
High School Rank	70.89	21.80	0.00	95.00
Number in High School Class	383.38	249.34	1.00	999.00
Number in High School**	3.31	1.00	1.00	4.00
Years of English in High School	3.17	.933	0.00	4.00

* 1 = Freshman
2 = Sophomore
3 = Junior
4 = Senior or Graduate Student

** 1 = Under 100 Students
2 = 100-500 Students
3 = 500-1000 Students
4 = Over 1000 Students

TABLE 2

COURSES TAKEN IN HIGH SCHOOL

N = 353

	% Yes	% No	No Answer
Reading Course	27.4	71.4	1.2
Was it required?	17.9	10.7	71.4
Grammar Course	65.5	29.8	4.7
Was it required?	73.8	20.2	6.0
Composition Course	88.1	11.9	0.0
Was it required?	65.5	31.0	3.5
Was English elective?	45.2	50.0	3.8

TABLE 3

KIND OF READING CLASS REQUIRED

N = 353

	%
No Answer	71.4
Speed Reading	3.6
Developmental Reading	10.7
Remedial Reading	4.8
Study Skills	3.6
College Reading Skills	3.6
Other	2.3

When asked why they had elected to take ED 106, 45 percent of the students responded that they thought it would improve their grade point average. Twenty percent responded that a friend had recommended the class to them.

TABLE 4

REASONS FOR TAKING ED 106

N = 84

Reason	Number of Students	Percentage
Friend Recommended	17	20.2
Advisor Recommended	6	7.1
Help GPA	38	45.2
High School Teacher Recommended	0	0.0
Taken Other Course in Department	3	3.6
Other	19	22.6
No Answer	1	1.3

A Pearson r correlation was used to compare the students' high school background information with their scores on the Nelson-Denny Test. Both pre- and post-test scores were used. It was hypothesized that grade point average in English and the number of years of English taken in high school would have a positive effect on the test scores. However, this did not prove to be true. Using a correlation coefficient of .70 as the basis for determining significance, correlations were analyzed. No significant correlations were found.

A closer look at words-per-minute scores shows the significant increases in rate between the pre-test and the post-test. On the pre-test, the majority of students read 300 words per minute or less. On the post-test, less than 20 per cent read at those rates, with the majority of students reading at 400 words per minute or more. With percentile rank scores and raw scores also showing increases, the data does support the assumption that students can increase their reading rates substantially without adversely affecting their reading comprehension abilities.

TABLE 5

CORRELATION OF TEST SCORES WITH BACKGROUND INFORMATION

N = 84

	Prescores			Postscores		
	Raw	Words Per Minute	Percentile Rank	Raw	Words Per Minute	Percentile Rank
Status	.216	.058	.269	.392	.448	.309
Years Since High School	.078	.014	.061	.326	.340	.444
GPA High School English	.487	.221	.359	.384	.066	.348
High School Rank	.189	.309	.250	.109	.182	.178
Number in Graduating Class	.263	.410	.227	.449	.317	.446
Number in High School	.500	.338	.438	.390	.451	.467
Years of High School English	.260	.470	.219	.153	.312	.094
Reading Class	.296	.470	.364	.488	.463	.335
Kind of Reading	.254	.210	.334	.359	.409	.416
Reading Required	.235	.216	.232	.438	.452	.408
Grammar	.339	.225	.240	.105	.249	.195
Grammar Required	.325	.198	.384	.439	.131	.374
Composition	.024	.022	.024	.430	.009	.323
Composition Required	.148	.091	.248	.040	.440	.017
English Elective	.401	.214	.449	.141	.106	.108
Reason for Taking ED 106	.019	.076	.003	.450	.336	.389

TABLE 6

NELSON-DENNY T-TEST DATA

N = 353

Variable	Mean	Difference in Mean	T-Value
Raw Scores - Pre-Test	38.15	- 8.50	- 9.36
Raw Scores - Post-Test	46.66		
W.P.M. - Pre-Test	215.28	-250.72	-26.02
W.P.M. - Post-Test	466.01		
Percentile Rank - Pre-Test	47.06	19.03	-11.17
Percentile Rank - Post-Test	66.10		

TABLE 7

READING RATE FREQUENCIES ON THE NELSON-DENNY TEST

Words Per Minute	Pre-Test Percentages	Post-Test Percentages
1 - 100	8.5	2.9
100 - 200	33.7	2.8
200 - 300	40.2	11.5
300 - 400	14.2	16.6
400 - 500	3.1	17.2
Over 500	.3	49.0

Conclusions

Students are entering land grant universities with deficient reading skills to succeed in chosen fields of study. Based on the results of this study, these students are no C average students, but A and B average students who graduated in the top of their high school classes. Many of these students came to the university where it could be assumed that a certain amount of competition for grades takes place.

While the majority of the students in this study had taken several years of English in high school, only a small percentage had taken a developmental reading course. Many of these students attended high schools where no reading courses were offered. This may be an explanation for the large number of students who entered ED 106 reading less than 250 words per minute, a rate considered minimal for success in collegiate-level work.

The implications for high school curriculum planners are clear. Students who intend to enter post-secondary institutions needs to prepare for college by developing necessary reading skills. It is important to develop these skills in high school so that, upon entering a post-secondary institution, students don't find themselves having to take extra courses, such as a reading skills class, in order to maintain good grades.

Many opportunities for developing reading programs at the high school level are available. The speed reading class described in this study could be adapted to fit into a high school English curriculum with few, if any, changes. Colleges and universities, private educational consulting firms, as well as curriculum specialists already employed by school districts, can offer suggestions for program development. A move to develop reading courses in high schools would benefit not only the students, but colleges and universities as well. Time and money now devoted to improving students' deficiencies could be utilized for improvements in other areas. Post-secondary schools should not be considered as centers of remediation for high school graduates with deficient reading skills. High schools and post-secondary schools should work together to make sure that all students have the opportunity for success in college-level coursework. Adequate reading skills are certainly a part of this success.

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Reading Ability and Knowledge of the Reading Process
Among Remedial and Non-Remedial Readers
at the Post-Secondary Level

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Statement of the Problem

Since much of what college students are expected to learn must be acquired through reading and studying textbooks, one might assume that students enrolling at universities have control of their reading processes. Indeed, a cursory survey of instructional materials for reading improvement for college students indicates an emphasis on vocabulary, comprehension, and reading speed, while little attention is devoted to "knowledge about" and "control of" the reading process. Various educational psychologists, however, have demonstrated that conscious control of one's cognitive processes is an essential element in meaningful learning. The term "metacognition" has been used to refer to this active monitoring and regulation of processes in relation to input data (Flavell, 1978).

Some recent studies indicate that students' reading ability is related to their conceptualizations about the process of reading. Most of this research has dealt with young children five to nine years old (Johns, 1972, 1974; Schenecker, 1976; Redi, 1966; Downing, 1969, 1980; Clay, 1972). Two studies, however, examined students views of reading at more mature levels. Canney & Winograd (1979) interviewed good and poor readers in grades 2-8 to determine how they conceptualized the reading process. Using schema theory (Anderson, 1977) they hypothesized that students develop a schema or knowledge about "what reading is" which may have an effect on their reading skills and the strategies they employ. Using an oral interview and written language task cards, they found that high comprehenders at every grade level were increasingly conscious of the meaning-centered nature of reading, while the lower comprehenders attended more to the decoding or word-centered aspects of reading. They stated that "poor readers, including the older students, seem unaware of the utility of context clues for reading and appear to treat each word separately" (p. 42). Furthermore, they determined that a student's schemata of reading can be used to differentiate between higher and lower comprehension.

Elder (1980) employed four tasks to investigate the perception of the reading process of ninth graders of average intelligence. These students were divided into three reading ability levels based on a norm-referenced test. All subjects responded to an open-ended interview (adapted from Burke, 1976), silent reading task cards adapted from the Canney and Winograd study, a forced-choice questionnaire, and oral reading task cards. Elder concluded that there were differences in the ways the ability groups perceived the reading process. The low ability readers appeared to think of reading as decoding and comprehending, and the high ability readers thought of reading as a meaning-getting process. She states, "In general...there was a shift from a decoding orientation to a meaning orientation as the reading levels of the groups increased" (p. 166). The low ability readers seemed preoccupied with decoding the letter, syllable, and word, whereas more proficient readers were more likely to be concerned with units larger than a word. Elder concluded that the instruments yielded techniques that could be used to "evaluate students' perceptions to identify those who perceived reading mainly as decoding and who consequently may employ limited strategies when reading" (p. 187).

The present study was designed to investigate the possibility that a relationship exists between reading ability and university students' schema of reading. In addition, the study was used to determine whether a remedial reading course offered as an elective to university students who felt they needed such instruction could influence students' schema of reading. Specifically, the research hypothesis for the study follow:

1. Poor readers will tend to have a word-centered reading schema while better readers will have a more meaning-centered schema.

2. Readers completing a researcher-designed remedial reading course will exhibit a more meaning-centered approach to reading.

Procedures

The subjects were 80 university students enrolled in a state university in East Texas. Sixty-two of these students had elected to take a one-credit course designed to help students improve their personal reading skills. These students will be referred to as the "Remedial Group" (RG). Eighteen subjects were volunteers from an introductory psychology class who were tested, but who received no instruction. These students will be referred to as the non-remedial group (NRG). The NRG group was included in an attempt to make the results more generalizable, since the RG students represent a unique group whose members believe themselves to be in need of remediation.

All students were given the Nelson-Denney Reading Test (1960) and were assigned to low, medium or high ability groups based on the results. For the RG subjects, 45 students scored below the 35th percentile, 9 scored between the 35th and 64th percentile, and 8 scored above the 65th percentile. Scores for the NRG subjects resulted in six, five, and seven students being assigned to the low, middle, and high ability groups respectively.

Each subject was interviewed and all responses were recorded on audio tape. The interview included seven questions which had been used by Elder (1980) and which were designed to help determine whether the subjects' reading schema was word-centered or meaning-centered. The seven questions were:

1. When you are reading, and you come to something you can't figure out, what do you do?
2. Think of someone you know who is a good reader. Give me that person's name. What is it about the way (name) reads that makes it good reading?
3. Do you think (name) ever comes to something he/she doesn't know when he/she's reading?
4. If he/she did come to something he/she didn't know when he/she was reading what do you think he/she'd do?
5. How would you try to help someone who was having trouble with their reading?
6. Does a person have to look at every letter in order to read something?
7. Does a person have to look at every word in order to read something?

The RG group participated in a sixteen week, one hour per week, remedial instructional program which emphasized concepts about the reading process and the importance of good comprehension skills. After instruction, the RG group was given five of the interview questions (questions 1, 2, 5, 6, 7) as a posttest. Two of the interview questions from the pretest were omitted since they lacked variability on the pretest, and since the researchers felt they were redundant.

For all administrations of the interview each subject's responses were coded into one of three categories by the researchers. If the response focused on "word" or less than a word (sounds, letters, roots, affixes, etc) or if the response indicated that the subject viewed reading as the oral pronunciation of words, the response was coded "1"; i.e. in response to question one, a student said "Stop and sound out the word." As Elder (1980) suggested, this seems to indicate that the reader is preoccupied with decoding word-level constitutents. If the response revealed that the subject was focusing on a unit greater than a word, the response was coded "3", i.e. "Reread that part and try to get the idea from the other sentences." If the response was a mixture of both "word" and "meaning" unit orientation, it was coded "2", i.e. "look up the word" (word centered) or "you might go back and try to figure it out" (meaning centered).

All ratings were done independently by the two researchers. Interrater reliability was .90.

Results and Discussion

Summary data were compiled for mean number of word-centered responses, mean number of meaning-centered responses, and mean total score on the seven open-ended interview questions administered at the beginning of the study. Category two, reflecting both word-centered and meaning-centered orientation was eventually dropped because of lack of variability. Table one presents means and standard deviations for the remedial and nonremedial groups.

TABLE 1

Means and Standard Deviations for Remedial and Non-Remedial Groups

	Mean total score	s	Mean no. of word-centered responses	s	Mean no. of meaning-centered responses	s
REMEDIAL GROUP						
Low	12.52	2.58	3.05	1.62	3.05	1.27
Medium	16.44	3.09	1.56	1.24	4.89	1.27
High	13.88	.99	2.63	1.06	3.50	.53
NONREMEDIAL GROUP						
Low	13.0	3.29	.33	.52	3.33	1.51
Medium	15.0	4.95	.40	.89	4.40	2.07
High	18.86	1.86	.29	.79	5.86	1.07

In order to determine whether or not there were differences in reading schema across ability groups, separate one-way analyses of variance were calculated for each of the three obtained means for both RG and NRG subjects. Table two presents the results of these analyses.

TABLE 2

Analyses of Variance Across Low, Medium, and High Reading Groups for Both Remedial and Non-Remedial Subjects

	Scores	MSB	MSW	df	F	P
REMEDIAL GROUP						
	Mean Total	58.47	6.37	2,56	9.21	.0003
	Mean Word-Centered	8.34	2.29	2,56	3.65	.03
	Mean Meaning-Centered	12.62	1.44	2,56	8.75	.0005
NON REMEDIAL GROUP						
	Mean Total	57.82	11.52	2,15	5.02	.02
	Mean Word-Centered	4.62	2.05	2,15	2.25	.13
	Mean Meaning-Centered	10.44	2.36	2,15	4.43	.03

It is apparent that differences exist across groups in all cases except in the mean number of word-centered responses in the NRG subjects. For the other five significant analyses, the Sheffe test was calculated to determine which means differed. All pairwise comparisons were made at the .05 level. Results indicated that the differences in all three analyses of the remedial students were between the low group and the medium group, with the medium ability group being more meaning centered and less word centered than are low or high readers.

In the non-remedial group, the low ability group appears to be less meaning-centered, with the medium and top ability groups becoming increasingly meaning-centered.

Thus, the first research hypothesis is confirmed for the NRG subjects, but only partially confirmed for the RG subjects.

It is worth noting at this point that in terms of reading ability as measured by the Nelson Denney Test, the only difference between the remedial group and the non-remedial group is that the mean reading level of the low readers in the non-remedial group is significantly lower than the mean reading level of the low readers in the remedial group (remedial group $x = 16.89$, $s = 8.69$; non-remedial group $x = 8.83$, $s = 5.00$; $df = 49$; $t = 2.21$; $p = .03$). The medium ability readers and the high ability readers in the remedial and non-remedial groups do not differ in ability. Therefore, the differences in the patterns of decoding/meaning orientation between the experimental and the control groups must be due to factors other than reading ability.

An informal investigation into the background of RG subjects produced interesting, and possibly relevant results. It was found that all except one of the students in the high ability RG subgroup were enrolled in teacher education programs and had reached at least junior standing in either special education or elementary education programs. In both these programs there has been a pronounced emphasis on the importance of word recognition and phonics skills. This might account for this subgroup's predisposition toward a decoding or word-centered focus, and could explain the lack of the expected stair-step effect across reading ability subgroups in the RG sample.

In order to determine whether or not there were differences after instruction, total mean scores on the five posttest interview questions in the RG sample (questions 1, 2, 5, 6, 7) were analyzed across ability subgroups. A one-way analysis of variance was conducted, and a significant F was obtained (low group x = 14.0, s = 1.93; MSB = 25.84, MSW = 6.31; df = 2,56; F = 4.1; p = .02). Though obtained differences show a trend of increasing meaning-orientation as reading ability increases, the Scheffe multiple comparison procedure revealed that the only significant difference exists between high and low group. This analysis reveals that posttest performance of high readers is more meaning-centered than the posttest performance of low readers. This finding is different from the pretest trend of the same subjects which was low, high, middle, with middle group more meaning-centered. One possible explanation is that the instructional program may have neutralized the effects of the emphasis on phonics in the teacher education programs. In addition, pretest-posttest mean total scores were computed for all students in the remedial group. These were compared by a correlated samples t test. A significant difference was found favoring the posttest (pretest x total = 9.27, s = 2.53; posttest x total = 12.40, s = 3.10; df = 58; t = 7.22, p < .0001). It is apparent that this group of remedial readers did become significantly more meaning-centered following 16 hours of instruction.

Actual responses to specific questions asked in the interview were revealing. Sixty-two percent of the subjects indicated that they thought a reader should stop reading to look up words in the dictionary when they came to something they could not figure out. This finding, too, may have implications for instruction. This may indicate that these readers feel that each word is an isolated unit. Or it may be that the subjects lack alternate strategies to gaining meaning while reading. Several students admitted that they skipped words as a strategy, yet they thought that this was a bad habit. However, one student in the non-remedial group said "It is impossible to recognize every word and read rapidly, but when I skip a word, I know that if is important, more than likely, the information will come up again." This student seemed to understand some important characteristics of written language.

Conclusion

The results of this study are similar to the results of studies with school age children. The low ability subgroups in both remedial and non-remedial groups were word-centered or decoding centered, while the middle and high groups were more meaning-centered. Statistical analysis of the data consistently suggested that students' reading success was related to their view of "good" reading behavior.

While the expected stair-step relationship, decoding to meaning and low ability to high ability, was found in the non-remedial group, in the remedial group the middle ability subjects were found to be more meaning-centered than the high or low ability subjects. An investigation of backgrounds of members of this subgroup revealed that six of the seven students were enrolled in elementary and special education teacher preparation programs which included a strong emphasis on phonics and word analysis skills as desirable instructional strategies.

After the experimental instructional period, which included instruction in metacognitive aspects of reading, the remedial group's posttest written interviews indicated that their views of the reading process had changed to a more meaning-centered orientation. Teacher trainers might note the findings that emphasis on decoding skills may tend to cause their students to view reading as a word-centered process. In an effort to help students "decode" independently, teachers often stress phonics, word structures and dictionary skills. The data, however, seems to indicate that an overemphasis on decoding, apart from meaning, may interfere with students' ability to view reading as a meaning-centered process.

This study, added to the body of research which suggests that a reader's reading ability, no matter what the age, is related to his or her perception of "good" reading behavior. Since there are many special programs designed to improve basic skills of reading, perhaps these programs should not only provide instruction in the traditional skills of vocabulary, comprehension and speed, but should also provide instruction in "knowledge about" and "control of" the reading process, with emphasis on reading as the transmission of meaning, rather than on reading as the pronunciation of words.

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The Effects of Guided Imagery upon Reading Performance: A Review of the Literature

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This paper presents a review of the literature concerning the effects of guided imagery upon reading performance. The theory, research and practice of guided imagery as it has been related to and used in reading instruction is the emphasis of this review. The first section, theory, provides a definition of imagery and categorizes its many forms. The second section, research, maintains the paper's perspective by delimiting the research discussion to four major subtopics: (1) imaginal effects upon learning, and memory; (2) guided imagery and reading achievement; (3) guided imagery and behavior, self-concept and anxiety; and (4) guided imagery and creativity. The third section, practice, describes the available literature proposing suggestions for classroom application of guided imagery. The fourth section discusses the implications of the data presented to reading instruction and suggests useful strategies for future research in this area of inquiry.

Educational researchers have recently reentered the domain of inner perception to determine its nature, effects and uses. The advent of cognitive and transpersonal psychology have created a resurgence of interest and research on what the behavioralist considered unmeasurable and unimportant. Many terms have been used to explain the same phenomenon: "visual imagery," "inner perception," "visualization," "imagery" and "creative visualization." Today's literature has favored the phrase "guided imagery" and/or "guided fantasy" to differentiate a particular kind of imaging from the other forms of visualizing. Both guided imagery and guided fantasy utilize our natural ability to recreate pictures in our minds to focus on a particular event or situation. Basically it is a process by which suggestions, offered by one individual, alter and/or direct the images fantasized, processed and produced by another (Leff, 1982).

Guided Imagery in Theory

According to Gerrard (Samuels & Samuels, 1975) meditation and visualization are the two important "new" concepts in 20th century American life.

> ...the last 2,000 years reads like a history of the social suppression of visualization and therefore a denial of one of our most basic mental processes. For visualization is the way we think. Before words, images were. Visualization is the heart of the bio-computer. The human brain programs and self-programs through its images.

Because of space limitations, this review will not chronicle the fascinating history of imagery. But an interested reader is referred to Seeing with the Mind's Eye: The History, Techniques and Uses of Visualization" (Samuels & Samuels, 1975), for a comprehensive historical and contemporary view. They traced imagery from the early cave dwellers of 60,000 B.C. through the Egyptian, Hermetic and Old Testament to modern physiology, psychology, and psychiatry.

Gordon (1972) defined images as "the perception of forms, or colors, or sounds, or smells, or movements, or tastes in the absence of an actual external stimulus which could have caused such perception." Kosselyn and Pomerantz (1977) added that "this image may be generated from underlying abstract representations, but the contents of these underlying representations are accessible only via generation of a surface (experienced) image."

The different types of visualizations have been categorized to better understand its dimensions (Samuels & Samuels, 1975):

1. Receptive visualizations involve spontaneous images only.
2. Programmed visualizations are images which are consciously held in the mind's eye.
3. Generalized visualizations deal with symbolic images.
4. Specific visualizations deal with actual situations, events and feelings.
5. Final goal visualizations are images of a situation which has already happened such as seeing a whole, healthy, cured body.

Guided fantasies are programmed visualizations which can be both generalized or specific depending on the desired goals, and process, or final goal state depending on the verbal cues.

The potentials of guided imagery have been popularized by a spate of books advocating its use for prayer (Sanford, 1947), as a facilitator to first aid and problem-solving (Bry, 1979), to solve sexual conflicts (Starr, 1977), to eliminate smoking, improve memory, and direct one's spiritual source of supply (Denning, 1980), to cure cancer (Simonton, 1978), and to improve athletic performance (Singer, 1980). Guided imagery has been incorporated into biofeedback, and the medical profession has documented conclusively its positive effects on migraine, headaches, anxiety, blood pressure, stress, symptoms, and other important physiological responses (Brown, 1974). It is being used in ten psychotherapeutic approaches (Samuels & Samuels, 1975) and in counseling of many types, such as vocational (Geiler, 1980), sexual (Mosher & White, 1980) and marriage (Bry, 1979).

Recent brain research reveals that the left and right hemispheres are responsive to different types of experience and that they respond in unique ways. The right brain seems better at passive comprehension, the left at active articulation. These tasks are not located in the halved brain, but each hemisphere prefers to process particular information. Thus the entire brain is utilized. Clark (1979) and several others (Murdock, 1982; Herr, 1981; Singer, 1980; Lazardus, 1977) believe that to realize our potential we must develop both types of functions and integrate learning experiences. They believe imagery, a normally right hemisphere function, can enhance learning of verbal and other left-brain tasks by this integration.

With all these positive benefits recorded, it behooves educators to investigate the effects of guided imagery upon learning in general, and specifically upon reading instruction because so many of the same factors influence reading performance.

Ashton-Warner (1972) understood the importance of imagery to communication and language when she wrote:

> The pictures in his mind are part of his mind as an organ is part of his body, as indispensible to the life of his mind as the heart to the body...His feeling, combusting in imagery is a functioning organ, which is the reason I call it organic.

Guided Imagery in Research

Imaginal effects upon learning and memory

As early as 1968 another reading educator, Ruth Strang (1968) noted the importance of visual imagery: "There is some evidence that children who consistently use imagery in their reading have more vivid and meaningful experiences."

A vast amount of research by educational psychologists has investigated the effects of visual imagery upon children's learning. According to Alexandrini (1982) these studies have demonstrated that meaningful learning is facilitated by several imagery-eliciting strategies: pictorial stimuli, concrete verbal stimuli, and imagery instructions. Most of the experiments have dealt with the impact of these strategies upon word and paired-associate learning, prose, and expository texts. The following studies include information related to guided imagery. Four studies (Lesgold, McCormick & Golinkoff, 1975; Rasco & Boutwell, 1975; Pressley, 1976; Levin & McCabe, 1977) showed that students who received imagery training had a higher reading comprehension rate than students not so trained. Another study by Horwitz (1971) supported this finding, but found imagery instruction made no significant different below the sixth grade level. He felt this age group was too developmentally immature to effectively utilize self-generated images. However, Finch and Gambrell (1982) indicated significant comprehension gains with imagery-trained fifth grade above- and below-average readers with a cued comprehension test.

There has been little inquiry into the relationship of mental imagery and reading attitude towards reading. Cramer initiated two studies to investigate these important factors. The first (Cramer, 1980) compared scores of 124 senior high students and found significant correlations between reading attitude and mental imagery, and between reading comprehension and reading attitude, but not between reading comprehension and mental imagery. The second study (Cramer, 1982) revealed that although reading comprehension was not significantly different for students classified as high, moderate, or low imagers on visual recall tasks, the moderate imagers had the lowest reading attitude mean score of the three. He suggested that explanations for this result would be found in future studies designed to explore mental imagery and reading attitude.

Dillingofski studied the effects of imposed (illustrations in text) and induced (images created by the reader) imagery strategies with ninth grade students with comprehension difficulties. The findings revealed that both strategies enhanced comprehension over the control group and that both were equally effective with concrete material. Imposed imagery was the more effective one for reading abstract passages from the social studies text. Since guided imagery uses induced images generated by listening to the directions of someone else, this study could have instructional implications.

Other studies (Levin & Devine-Hawkins, 1974; Brooks, 1967) revealed that mental imagery was more readily elicited during listening to a passage rather than reading it. However, with training this can be changed. Miccinati synthesized the findings of two recent studies (1981; 1982) by stating, "Imagery instruction improves comprehension of what is heard and read. Imagery provides a meaning of encoding and organizing prose in a student's working memory." One-hundred and fifty multi-ethnic third and sixth graders were given a six-week imagery training program consisting of auditory (listening, imaging and recalling) and visual (reading, imaging and recalling) imagery for thirty minutes twice a week. Both groups' reading level and performance on post-tests correlated with the imagery training tasks. The sixth graders had the highest correlation between reading level and comprehension.

Several other studies (Groninger, 1974; Ruch & Levin, 1977) have supported the idea that the effects of imagery-eliciting strategies occur at the initial or storage phase of the memory process rather than at the retrieval. These studies propose that imagery strategies during presentation serve as contextual organizers within which the information to be learned can be inserted. The private nature of mental images makes it difficult to describe the mechanisms of their nature and effects. Radical behaviorists equate mentalistic constructs such as imagery with some sort of linguistic activity. However, a study by Aiken (1971) concluded that the use of mental imagery in recall of information cannot be reduced entirely to linguistic mechanisms:

> These data lean support to the belief that mental imagery is a useful constraint in the theoretical analysis of memory and of potential practical import to those concerned with the technology of education.

Guided imagery and reading achievement

The writers are not aware of any studies investigating solely the effects of guided imagery upon reading achievement. However, there have been several that include guided imagery in the treatment examined. Guided imagery is an essential aspect of autogenics, suggestopedia, and some forms of biofeedback. The results of these studies reveal a positive relationship between the treatment including guided imagery and reading achievement.

Guided imagery was an important component of a study involving autogenic relaxation training by Frey (1980) in West Germany. Thirty third through sixth graders were matched for age, sex, anxiety test level, intelligence, reading and orthographic performance. The training included techniques of progressive muscle relaxation, musical quiet periods and imaginative experiences for one year. The teacher led the children in verbal guided fantasies during the musical periods. Results indicated that the experimental group's improved ability to relax and concentrate did indeed lead to greater academic progress. Frey pointed out that six pupils had to be eliminated from the program due to their extremely impulsive behavior which disturbed the rest of the class. He also emphasized that "the improved achievement of the experimental children might be due not to relaxed children but to relaxed teachers."

Suggestopedia is considered by its creator, Lozanov of Bulgaria, to be a new science of education based on his principles of suggestion--suggestology (Herr, 1978). Proponents of suggestopedia assert that its success comes from changing the learner's attitude toward learning. The desuggestion/suggestion dialectic frees the student from negative suggestions which limit his/her potential creativity and personality. Visualization and guided imagery are used in many ways in the suggestopedic process. They help reduce tension, create an emotionally involved atmosphere, provide a sense of joy in learning, and are used as a mnemomic aid to memorization of vocabulary and information. The Americanized version of suggestopedia is the Suggestive-Accelerative Learning and Teaching (SALT) Technique. Although serious research has just begun in the United States, preliminary studies indicate that more students learn more material more easily with the SALT method (Herr, 1978). The majority of the work has been in foreign language instruction. This review includes only those studies related to reading.

Several studies have investigated the effects of suggestopedia as a teaching of reading method and have found it successful with severely disabled readers (James, 1976), remedial readers (Prichard & Taylor, 1976) and beginning readers (Racle, 1979). Accelerating Learning: The Use of Suggestion in the Classroom (Prichard & Taylor, 1980) includes a chapter on teaching reading via suggestopedia techniques. They suggest at least a two week training period in relaxation and visualization for younger children prior to the accelerated learning cycle. An example of how guided imagery and visualization have been used in suggestopedia is a study by Schuster, Prichard and McCullough (1981) on spelling instruction. Elementary students first relaxed to music and followed a guided fantasy of themselves in a safe, calm, place far away from the classroom. They saw themselves learning the lesson material quickly and easily. Later they made visual imagistic connections between each word and its spelling. Lastly they visualized the correct spelling of the word as a mental blackboard. Many aspects of this study could be adapted to reading methodology.

Biofeedback studies may or may not include the utilization of guided imagery in the body mastery process. One study that did include guided imagery with open focus relaxation therapy and electroencephalographic (EEG) auditory feedback (Tally, 1976) indicated that the treatment significantly lowered anxiety and tension and increased reading achievement and vocabulary scores of college freshmen enrolled in a remedial reading course.

Guided imagery and behavior, self-concept and anxiety

The psychological changes associated with guided imagery were investigated with a controlled study by Cohen and Twenlow (1981). They substantiated the positive effects upon twenty college students who were given eight sessions of guided imagery. Post-data indicate significant positive changes in inner direction, self-regard, self-acceptance, acceptance of aggression, and the nature of man. They concluded that guided imagery may be a method that facilitates perceptual and attitudinal changes.

Timlin's (1982) study with delinquent adolescents supported the inner direction influence of guided imagery. The forty experimental subjects significantly changed their locus of control in the internal direction. However, this change did not foster any corresponding shift in self-acceptance or behavioral self-esteem as did the former study. Carter

(1979) examined the effects of biofeedback/relaxation training with visual imagery tapes on 41 learning disabled elementary boys. Findings revealed a significant improvement in self-acceptance and perception of ability and more effective control of muscular tension in the face of reading stress as measured by electrodes. Carter concluded that measurement of skeletal muscle tension levels may be developed into a reliable index of physiological stress while reading.

According to Cohen (1980) guided fantasy along with deep breathing, relaxation and humor are ways to break the "helpless-hopeless" self-defeating attitude of many test-takers. She suggested using guided fantasy to set the stage for positive test-taking experiences. However, very little research has been conducted to measure the effects of guided imagery on test anxiety. Imagery is a way to mentally rehearse the exam and thus lower performance anxiety. A study by Romero (1979) showed that taped relaxation guided imagery procedures were just as effective as biofeedback training in reducing test anxiety as measured by Suinn Test Anxiety Scale.

Guided imagery and creativity

Speaking on creativity Einstein once said (Clark, R.) "When I examine myself and methods of thought, I come to the conclusion that the gift of fantasy has meant more to me than my talent for absorbing positive knowledge." Samuels & Samuels (1975) added that receptive visualization is a reliable means of getting access to the state of consciousness where creative ideas come into the mind. Receptive visualization plays a crucial role in the incubation and illumination stages of creativity. Many studies have examined the effects of guided imagery and receptive visualization upon creativity.

Kearns (1978) studied the effects of relaxation exercises and guided imagery on the creative thinking and writing of fourth, fifth and sixth graders after eight one-half hour training sessions. The findings provided a significant difference between the two groups on creative thinking, but not creative writing. He felt the writing data were inconclusive because of the lack of interrater/reliability. In a later study, Kearns (1979) deleted the relaxation exercises and examined the effects of guided fantasy alone on gifted students. The experimental group scored significantly higher on tests of divergent thinking than the control group. Mahoney (1981) found that students exposed to guided-imagery produced the greatest amount of fluency, flexibility, originality and quality in their writing regardless of their hemispheric dominance. Kehoe (1978) developed and tested a two-week imagery enhancement course for sixty-three emotionally handicapped secondary students. The course significantly increased vividness of visual and auditory imagery, memory imagery and creative originality.

Guided imagery has been found to aid in the flow of creative ideas. Leff (1982) incorporated guided imagery with art instruction and evaluated its effect on the creative drawings of adolescents. He concluded that the guided imagery caused marked changes in the students' productions. Rachelson (1977) used guided imagery as an instructional strategy for teaching hypothesis generating in science. The findings support the conclusion that guided imagery can be used to foster generative thinking during the course of scientific inquiries.

Two studies which dealt with the influence of imagery on problem-solving fluency and originality of adults were significantly enhanced by a one-session treatment in structured fantasy. Moses (1982) reported that fifth grade students with training in visualizations were able to organize essential data and arrive at the solution with greater facility than the control group.

Guided Imagery in Practice

Many practitioners have not waited for conclusive date-based research before applying guided imagery techniques to the school setting. Numerous books, tapes, articles, conference presentations and even a newsletter are available for the experimental-minded teacher.

The following books and tapes are recommended for the classroom use of guided imagery. Spinning Inward (Murdock, 1982b) explains how to use guided imagery with ages 3 to adolescent. The sixteen classroom-tested imagery activities focus attention, relax the body, increase psychomotor skills, make writing easier, enhance cultural pride, aid coping with stress and achieving harmony. The activities are designed for in-class as well as at-home experiences. Guided fantasy activities are included in 100 Ways to Enhance Self-Concept in the Classroom: A Handbook for Teachers and Parents (Canfield & Wells) to stimulate creative writing, raise achievement and motivation and foster self-acceptance. Windows to our Children (Oaklander, 1978) describes the author's extensive work with children in therapy and includes many scripts suitable for the classroom as well. Guided Imageries Kids Love, Part I and II (Galyean, 1982) are tapes which contain six guided imagery activities suitable for ages 10 through adult. Murdock (1982a) has taped Guided Imagery the Kids Love: Ages 5-10 with six guided imageries for younger children, as well as a live classroom experience with responses.

A few articles have been published which contain practical ideas for using guided imagery. Grabow (1981) describes many ways to use visual imagery in the classroom as a teaching tool for learning disabled children. She purports that imagery used in a game-like atmosphere can positively effect social behaviors, assist in learning new concepts and aid emotional control. Herr (1981) explains four steps for preparing and introducing guided imagery activities: content, multi-sensory appeal, practice, and introduction. A lesson from a German Literature class is used as an example format. Roberts (1975) advocates guided fantasy as one of the current methods being applied to shift the focus from external to internal awareness, an important objective of transpersonal education. He suggests directed fantasy trips for learning specific content and open-ended fantasies to evoke creativity and aid self-discovery.

Conference presentations on the topic of guided imagery are starting to appear. Cook (1983) suggested guidelines for using guided imagery as a stimulant for creative writing. Parrish, Elliott and Thompson (1982) presented a guided fantasy for science as a sample of its classroom application along with other emerging transpersonal and technological practices in remedial reading instruction.

The newsletter Imagery is the bulletin of the American Association for the study of Mental Imagery (580 S. San Vincente Blvd., Los Angeles, CA 90048). Many of the active researchers and theorists of imagery contribute articles and share research information.

Implications for Reading Instruction

In reviewing the research conducted to date on guided imagery and reading performance, the following major conclusions can be made:

1. There is a scarcity of research in this promising area. Some of the studies included small samples, and need to be enlarged. Several need to be replicated with different populations. Overall, more data are needed to make instructional decisions.

2. Mental imagery serves as a contextual organizer and memory aid for comprehension.
3. Additional data are needed to ascertain the age level at which mental imagery increases reading comprehension.
4. The relationship between reading attitude and mental imagery and induced and imposed imagery and comprehension deserves more attention by researchers.
5. As part of autogenic, bio-feedback and suggestopedic procedures, guided imagery has positive effects on reading achievement.
6. The effects of guided imagery upon behavior, self-concept and anxiety reduction seem promising, but more research is needed to ascertain the relationship conclusively.
7. Guided imagery aids the development of creativity in writing, thinking, drawing and problem-solving.
8. Guided imagery training has been successful with all age levels from elementary to adult and all ability levels from learning disabled to the gifted.

As a result of the above eight statements, the writers conclude that the guided imagery technique indeed holds potential for improved reading performance of students and thus should be further investigated by quantitative, qualitative and applied research studies. Since research on guided imagery and reading is in its infancy, the writers believe that several naturalistic studies of affective dimensions would be necessary to generate appropriate hypotheses for future empirical investigations. Because perceptual and attitudinal changes in inner directedness, locus of control, self-esteem, confidence, and reading anxiety are difficult to measure (and so individualistic), personal interviews and observations to determine the subtle effects of the sustained use of guided imagery would be most beneficial.

The cognitive dimensions affected by guided imagery should be investigated by quantitative measures. Guided imagery needs to be examined in isolation from other treatments such as autogenics, biofeedback and suggestopedia, to determine its effects without the influence of other variables. Such studies can also learn whether a guided imagery experience serves as a contextual organizer and memory aid for comprehension as mental imagery does.

Results from studies such as these can move the guided imagery technique from an intuitive to a data-based teaching method. Educational research on guided imagery can help teachers adapt and modify a practice already useful in medicine, psychotherapy, counseling, and athletics. More information is definitely needed if guided imagery is to have a significant impact on the education of children, adolescents, and adults. The potential is great, but as yet unfulfilled.

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A Rose by Any Other Name:
Reading Comprehension Research

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Many of us have multiple classroom roles; we are reading teachers and we are English teachers; we choose curricula and devise instructional strategies; we conduct research and interpret research; we translate theory into practice and test the effectiveness of new approaches. Somehow we integrate all of our responsibilities and recognize areas of overlap. But too often all of us, caught in the demands of day-to-day pressures, lose sight of the "forest". We think we must narrow our views to specific perspectives rather than expand our orientations to include the larger whole of reading comprehension research.

But like many human endeavors, educational research studies are often more alike than they are different. However, vocabulary or ultimately superficial differences cause readers to focus on dissimilarities. Therefore, we propose three hypotheses: 1) that research, like other activities in a given time, is affected by society at large and available technology; 2) that by looking at research from differing perspectives but on the same topic (namely reading comprehension research and response to literature research), we will see dramatic overlaps serving to support and validate the findings in both fields; and 3) that research does have, though often in a subtle way, an impact on practice. To illustrate our theses in our present media-oriented age, we found it appropriate to attempt a visual representation of the years 1940 through 1980 accompanied by explanatory text.

The purpose of this article is neither to provide a comparison and contrast of research methodologies and findings nor to provide a glossary of terms and definitions used in similar strands of inquiry; we do hope that the reader will see that the four columns provide a series of markers or guideposts set in an historical framework and will be intrigued enough by unfamiliar sources to read them first hand.

Insert Table Here

Column I corresponds to hypothesis 1: Events, issues, social concerns indelibly color research and educational practices. a) Events, both national and international, dramatically intrude upon all aspects of all institutions. For example, the great influx of immigrants in the second half of the 19th Century changed the concept of the role of the school in society from a place to prepare the elite to rule to a place for providing universal literacy and the means for assimilation. b) Needs identified by society are frequently the exigency for research. Fueled by the Civil Rights Movement and the upheavals of the sixties, interest in better ways of teaching reading has both dominated professional journals and attracted attention in the popular press. More federal money has been awarded for research in reading than for any other educational topic. c) Values held by large groups influence research. For example, the critical time ("Decade of Criticism") after Sputnik found us working in empirical, quantitative modes and borrowing techniques from the "hard sciences." d) Tools of one discipline often open up new possibilities in other fields. For instance, experimental psychology and its inferential statistical models are commonly used now in reading/response to literature research.

Consider Gough's "One Second of Reading" (1972) as an example. The Decade of Criticism with its leaders' allegations that in the basic skills areas we did not even know how people read much less Why-Ivan-can-do-it-so-well-and-our-Johnny-cannot was one aspect of the context. N.D.E.A. funding for work in reading and writing had caused graduate enrollments in Psychology, English, and Education Departments to mushroom, and--closely related--National Science Foundation funding of studies in psychology and linguistics (change from an earlier 'hard sciences only' approach) had provided two more aspects: both a 'new' model of reading process (the "psycholinguistic model") was being discussed and funding for in-depth research on processes in reading and writing became impossible. It was the decade of the Right to Read. Individualized instruction became a rallying cry.

In this context, we find the text "One Second of Reading." Gough, at times almost whimsically, infers the steps a person may gc through between the time the eyes set on the verb phrase "Suppose the eye" and the time the reader says aloud "Suppose the eye...." From that model he goes on to a millisecond (by millisecond) break out of probable steps in the process. In addition to his personal research training, Gough utilizes his own interest, his lack of acceptance of a "reading guessing game" (from Goodman's "Psycholinguistic Guessing Game"), and an environment in which people want to know how we read, how we can teach it better, and how they can help fund researchers' (such as Gough's) attempts to answer those questions. Eye-camera research now had a context. We are in no way suggesting any one event is causal or predicated only on any other, but that the interactions of events, needs, values, and tools influence all expressions of an age.

We maintain that it is no accident that Gough's article "One Second of Reading" first appeared in 1972, that the educational community was feeling the effects of the experimentation of the sixties, that technology was becoming more sophisticated and that educational research journals were beginning to lean toward experimental studies.

Columns II and III are evidence for hypothesis 2: Column II includes ten sources representing response to literature research arranged into a chronological view of research under that title. Obviously, not every significant study could be included, but ten sources are highlighted as indicative of trends. Specifically, the Purves and Rippere work exemplifies the potentiality of computers in making possible the investigation of large samples. Instead of relying on self-reporting methods characterized by research in response to literature prior to 1950, or depending on relatively small samples, Purves and Rippere brought response to literature research into the computer age; they analyzed over 2,000 written responses to literature, developed a well-defined matrix, and analyzed objectively, rather than subjectively, what happens when a reader responds to written discourse.

Likewise, the ten "representatives" of reading research were chosen because of their widely recognized contributions to the field or unique embodiment of a time or technique.[1]

Columns II and III as evidence for hypothesis 2 are most interesting to us. In spite of differing orientations and vocabularies, researchers in the language arts and those in reading have come to remarkably similar conclusions by differing routes. The most dramatic example can be drawn by comparing the works of Louise Rosenblatt with those of Goodman, Smith,

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[1] We apologize to all those we have left out. The great body of research in comprehension necessitated our somewhat arbitrary choices. We wanted, as much as possible, to include resources with at least recognition potential to both classroom teachers and other professionals.

Pearson, Ruddell, et al. What Rosenblatt (1938) called the 'transactional' theory of reading is now being termed the psycholinguistic or schema theory of cognitive processing. She argued in Literature as Exploration (1938) and reiterated in The Reader, the Text, and the Poem (1978) that reading is an active, two-way process dependent on the purposes of the reader, prior experience of the reader, and demands of the text. Her findings have been echoed, in one way or another, by most subsequent reading research, though reading researchers may be unfamiliar with her work since it has been largely in the domains of literary criticism and response to literature. (See Palmer, 1981). One of the major purposes in providing the chart is to emphasize that both Columns II and III have been occurring side-by-side with insufficient cross-over.[2]

Finally in Column IV, we list major trends in teaching reading/literature, significant or unique instructional approaches, and specific publications used widely by teachers. For all the seeming discrepancies between research and practice, we feel our chart outlines, in a way more convincing than a discussion could, some of the effects on classroom practices--good or ill--of shifts in research foci, social movements, and trends in reading comprehension research.

Column IV (the evidence for the third hypothesis) is admittedly not as tidy as Columns II and III. Whereas all of the entries in the second and third columns share an important variable--implicitly or explicitly they support the contention that reading is an active interaction between the reader and the text--Column IV includes a list of 'unlike' sources. For example, the Moffett-Wagner (1976) title is one that was highly regarded by many reading/language arts educators, but the series based on it, Interaction, was a huge failure in the schools. The system, a product of the emphasis on individualization in the 1960s, was unwieldy for teachers, expensive for school districts, and difficult for students. Interaction, an all level (K-13) drama/oral language-based approach, consisted of hundreds of activities and paperback book titles.

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[2] To truly exhaust research in comprehension, we would also need columns in educational psychology, cognitive psychology, psycholinguistics, etc. The same overlaps exist within these fields.

On the other hand, Scott-Foresman, Ginn, and Houghton Mifflin all publish widely used, traditional, basal series which reflect in different combination the three major methods of teaching reading--phonics, sight word, and linguistic approaches. Finally, Science Research Associates (SRA), which publishes materials that are popularly used in grades 7-12, reflects (through most of its publications) programmed approaches to teaching secondary reading.

We hope you see our four-column chart not as a final word but as a (new?) way of looking at the role theory plays in a society, how supportive varying fields of inquiry can be, and how theory can be reflected in practice.

TABLE

I Events, issues, social concerns	II 10 Sources Representing Literature/Response to Literature Research	III 10 Sources Representing Reading Comprehension Research	IV Key educational movements, curricula & Instructional Strategies Reflecting Columns I through III
Recession "Columbia"			Integrated Language Arts--------→ ←Consumer Education
1980 ←New Wave E. R. A.	Carlson (79) Applebee (78) Rosenblatt (78) Favat (77)	Smith (78) Pearson (78) Anderson (77)	(Prepackaged Reading Kits, e.g., RFU, SRA, Specific Skills Series) Man: A Course of Study ←Ethnically/Sex Role Balanced Anthologies ←Right to Read Decade--------→
'Acid' Rock President resigns	Purves & Beach (72)	Gough (72)	←----Individualized Instruction---→ ←--Diagnostic/Prescriptive Instruction-→
1970 ←Civil Rights/Voting Rights→ Folk Music VietNam "Decade of Criticism" MLK, Jr., RFK killed	Purves & Rippere (68) Fader (66) Squire (64)	Ruddell (69) Chall (67) Goodman (67) Singer (65)	NDEA, "Harvard Physics", BSCS, "New Grammar", "New Math" Bank St. Readers "Ethnic" Readers
NDEA JFK killed 1960 Rock 'n Roll Sputnik			←--Programmed Instruction ←-Teaching machines-------→ ←-Skinnerian conditioning--------→
New Jazz "Cold War" "Ike" Korea	Loban (54)	Russell (56)	
1950 ←Big Band Era→ Atomic Bomb WWII 1940	Rosenblatt (38)		---Progressive Ed. Assoc. -------- I.R.A. begins, now N.C.T.E. and I.R.A. out of orig. M.L.A.

Background: 1900-1938 Events leading up to the fourth decade: Abstract art has been in vogue and American expatriate writers have dominated American literary scene for a decade; Great Depression is 'bottoming out/into' WWII; I.A. Richards is ascending as influential critic; Progressive Ed. Assoc. and philosophy of Dewey are the key subjects under discussion in many educational journals.

Huey (08)

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Reflections on:

Do High School Remedial Readers Comprehend Better When Reading Silently or Orally?

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Wiesendanger and Birlem's study of oral versus silent comprehension in adolescents (Research on Reading in Secondary Schools, No. 8) merits reviews and further discussion.

Subjects included in this study were 30 fourteen- and fifteen-year-old participants in a rural summer reading clinic in western New York State. The researchers stated that the subjects had average or higher I.Q.'s but needed remediation in reading.

The subjects' instructional comprehension levels were identified through the Classroom Reading Inventory (1976) by N. J. Silvaroli. The students were randomly divided into two groups, group A receiving first the oral test, then the silent test, and group B receiving the same tests in reverse order. After reading each passage, the students orally answered questions asked by the examiner.

Test results showed that the subjects' instructional levels were significantly higher on the silent tests than on the oral tests. The researchers concluded that ". . . when adolescents are given material to comprehend, their comprehension level would be significantly higher if the material was read silently." Implications discussed by the researchers were that students should read silently during comprehension lessons and that instructional comprehension levels should be identified with only silent reading activities.

The question investigated by the researchers is important and of interest to reading professionals. The testing procedure and instrumentation were sound. However, a severe amount of sampling bias is apparent in this study. The number of subjects was merely thirty, and rather than a random sample of adolescents, all thirty students at a rural summer reading clinic were included. Thus the subjects come from a limited geographical area, and bias is present due to the selective conditions that would result in a student's placement in a remediation clinic. Obviously, population validity is very questionable in this study. As Borg and Gall (1979) have stated:

> The method of selecting a sample population is critical to the whole research project. If research findings are not generalizable to some degree beyond the sample used in the study, then the research cannot provide us with new knowledge, cannot advance education as a science, and is largely a waste of time.

A further flaw of this study is the degree to which the researchers generalized their findings. Subjects included remedial readers exclusively, yet study conclusions and implications were extended to "adolescents" without restrictions.

Another deficiency of this study is the near-absence of information concerning actual student instructional comprehension levels. Wiesendanger and Birlem noted that J. E. Swalm (1972) has suggested that the level of reader proficiency may influence the relative effects of oral and silent reading on comprehension. Yet relevant statistics that could have shed light on this topic were not included. A further question that should have been explored is whether similar comprehension patterns were noted for independent and frustration levels, and if not, why not. Future research would do well to include such findings.

Still the question remains: Do high school remedial readers comprehend better reading orally or silently?

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Reflections on:

Learning Styles and Content Area Reading Instruction

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Not too long ago there was much being written concerning learning styles, and it seemed to hit a very responsive chord among teachers. It even looked as though learning style grouping would soon become as common as ability grouping.

But, it did not happen. Now that the furor has died down, we tend to go about the business of teaching as if we had never heard of learning styles. We teach in the manner that suits us, hope that students will learn well, and forget that each child has a unique style of learning.

Richard Santeusanio (Spring 1982) has done teachers a great service by once again reminding us that students' learning styles are an important consideration for competent content area instruction. Much has been written and is being written concerning the importance of teaching reading in content areas. There has been a plethora of suggestions for pre-reading instruction, questioning techniques and study guides, and devices for retention of material read. But, the question remains, as Santeusanio says, how do we know which of these procedures to use with our particular students?

The point, of course, is: let us find out more about our students' learning styles and become more effective teachers. Santeusanio suggests many different learning style inventories that could be used. We need to look at these and find the one that would tell us what we would most like to know. Once we have administered one of these inventories we could then match our techniques to the learning styles of the students.

The question Santeusanio neglected to answer is: how do we accommodate all the learning styles in a particular classroom? There is certain to be great variation within any group of students. Are we to teach to the learning style of the majority? Do we vary our teaching methods so as to cover each learning style represented at least once in a semester? Or do we group the class according to learning styles and teach each group using a different technique?

All this must be considered before we can use the concept of students' learning styles to make our teaching more effective. Santeusanio, are you listening? You need to give us more information before we can use what you have already given us. We would like to consider the 150 different learning styles we meet in a day. How about some suggestions for management?

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